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1902

REPORT

. . *of the* . .

BOARD *of* REGENTS

. . . *of the* . . .

University of Arizona

. . . *for the* . . .

YEAR ENDING DEC. 31, 1902

THE CITIZEN PRINTING AND PUBLISHING CO., TUCSON, ARIZONA

REPORT

OF THE

BOARD OF REGENTS

OF THE

UNIVERSITY OF ARIZONA

FOR THE YEAR ENDING DECEMBER 31, 1902

1903
THE CITIZEN PRINTING AND PUBLISHING CO.
TUCSON, ARIZONA.

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OFFICE OF THE BOARD OF REGENTS,
UNIVERSITY OF ARIZONA.

Tucson, Arizona, January 7th, 1903.

Members.
Ferris F. Fitch, Chancellor,
J. A. Zabriskie, Secretary,
J. M. Ormsby, Treasurer,
Winfield Scott.

Ex Officio Members.
Hon. A. O. Brodie,
Governor.
Hon. N. G. Layton,
Supt. Public Instruction.

Hon. A. O. Brodie,
Governor of the Territory of Arizona.

Dear Sir: The Board of Regents of the University of the Territory of Arizona has the honor to present to you herewith its annual report for the year 1902.

In compiling this report, the Board has deemed it advisable to present to you statements in detail in relation to the different departments of the University, which have been made by the several Professors directly to the Board at its request, and which are herewith incorporated as a part of this report.

FERRIS S. FITCH, Chancellor.
J. A. ZABRISKIE, Secretary.
J. M. ORMSBY, Treasurer.

Tucson, Arizona, January 1, 1903.

To the Honorable Board of Regents of the Universtiy of Arizona:

Sirs: I have the honor to submit the Annual Report of the President of the University of Arizona for the year ending Dec. 31, 1902.

The departments and courses of study of the University are arranged as follows:

I. College of Agriculture and Mechanic Arts.

A literary course leading to the degree of Bachelor of Philosophy.

A scientific course leading to the degree of Bachelor of Science.

An engineering course leading to the degree of Bachelor of Science.

An agricultural course leading to the degree of Bachelor of Science in Agriculture.

A chemistry course leading to the degree of Bachelor of Science in Chemistry.

II. School of Mines.

A mining engineering course leading to the degree of Bachelor of Science in Mining.

A two years' course in mineralogy and assaying.

A bureau of mines and assaying.

III. Agricultural Experiment Station.

IV. Sub-Collegiate Department.

English, classical and scientific courses.

Manual training and domestic science courses.

Commercial course.

FACULTY.

The following changes in the faculty have occurred since the last report:

On May 4, Frank Yale Adams, A. M., who had been Acting President since Sept. 5, 1901, was elected President of the University of Arizona for a term of two years. On July 1, Robert Humphrey Forbes, M. S., resigned his position of Professor of Chemistry in order to devote all his time to the Agricultural Experiment Station work.

Louise H. Foucar, A. B., Professor of Ancient and Modern Languages, was given leave of absence for one year without pay to date from September 1st.

Opal Le Baron McGauhey, B. E., Instructor in Physical Culture and Elocution, was given leave of absence for one year without pay, to date from September 15th.

The term of Mildred M. Chase, B. A., Matron expired on September 15.

George W. Cole, C. E., (Captain U. S. A. retired) Professor of Military Science and Tactics, died on Sept. 27, 1902.

The following new appointments were made to take effect on the dates specified:

Sept. 15, Marion Cummings Stanley, A. B., (Univ. of Cal.) Preceptress in charge of North Hall and Instructor in Latin and English.

Sept. 15, George Mark Evans, LL. B., (Univ. of Mich.) Registrar and Instructor in Mathematics.

Sept. 15, John Mercer Patton, A. M., (Va. Mil. Inst. and Indiana Univ.) Assistant Professor of Modern Languages and Acting Professor of Military Science and Tactics.

Sept. 21, Alice Olivia Butterfield, A. B., (Stanford Univ.) Instructor in Physical Culture and History.

Sept. 21, John William Gorby, A. B., (Marietta Col.) Instructor in Oratory.

The following list gives the Faculty as at present constituted:

Frank Yale Adams, A. M., President; Professor of History, Economics and Pedagogy.

William Phipps Blake, Ph. B., A. M., Professor of Geology, Metallurgy and Mining; Director School of Mines.

Howard Judson Hall, A. M., Professor of English; Librarian.

Robert Humphrey Forbes, M. S., Director and Chemist Agricultural Experimet Station.

Sherman Melville Woodward, M. S., A. M., Professor of Mathematics; Meteorologist Agricultural Experiment Station.

Frank Nelson Guild, B. S., Professor of Mineralogy and Analytical Chemistry; Professor of Chemistry.

Alfred James McClatchie, A. M., Professor of Agriculture and Horticulture; Agricultural Experiment Station.

David Hull Holmes, B. S., Professor of Mechanic Arts and Drawing; Secretary of the Faculty.

Gordan H. True, B. S., Professor of Animal Husbandry; Agricultural Experiment Station.

William W. Skinner, M. S., Assistant Chemist Agricultural Experiment Station; Instructor in Photography.

George Edson Philip Smith, B. S., C. E., Professor of Physics and Engineering.

John James Thornber, A. M., Professor of Biology; Botanist, Agricultural Experiment Station.

John Mercer Patton, A. M., Assistant Professor of Modern Languages; Acting Professor Military Science and Tactics.

Mabel Gray Hoover, Instructor in Domestic Science.

Nora Towner, President's Secretary; Instructor in Stenography and Typewriting.

Hattie Ferrin, B. S., Instructor in English and Latin.

Elbert John Hollingshead, Instructor Bookkeeping, Civics and Commercial Law.

Marion Cummings Stanley, A. B., Preceptress; Instructor in Latin and English.

George Mark Evans, LL. B., Registrar; Instructor in Mathematics.

John William Gorby, A. B., Instructor in Oratory.

Alice Olivia Butterfield, A. B., Instructor in Physical Culture and History.

James Stephen Mann, B. S., Commercial Assayer and Instructor in General Chemistry.

The growth in students and faculty and the number of graduates are shown in the following table:

Years.	Professors.	Instructors.	Students.	Percent of College Students.	Graduates.
1891—1892	6	2	31	29	
1892—1893	8	4	38	50	
1893—1893	7	2	57	50	
1894—1895	9	1	47	50	3
1895—1896	10	4	100	35	
1896—1897	9	5	151	23	3
1897—1898	11	4	156	25	4
1898—1899	10	7	133	23	1
1899—1900	12	10	161	26	4
1900—1901	12	7	225	21	4
1901—1902	12	7	215	33	9
1902—1903	11	9	220 (est.)	40 (est.)	8 (est.)

The apparent falling off in attendance last year is explained by the fact that owing to raising the entrance requirements to the sub-collegiate department, one class numbering 48 was dropped, so that for comparison with previous years, the attendance should be taken as 263.

COURSES OF STUDY AND DEGREES.

All facilities and privileges of the University are open to qualified persons of both sexes.

The University offers four-year courses of study leading to the degrees of Bachelor of Philosophy and Bachelor of Science, and to these degrees specialized. In each course the work is partly required and partly elective. Each student doing full work is required to take four hours of recitation work each day. In laboratory work a period of from two to two and one-half hours is considered the equivalent of one recitation hour.

Persons of mature age and with sufficient preparation, who are not candidates for a degree will, in some cases, be admitted to regular classes as special students, provided, however, that in all such cases they show to the satisfaction of the instructors in charge that they can take the course with profit to themselves and without detriment to the regular class.

The faculty reserves the right to omit classes in any course of instruction unless a suitable number of students register for the course.

Students who have completed satisfactorily the required work, and the specified amount of elective work as shown in the accompanying schedule will be given the degree of Bachelor of Philosophy or Bachelor of Science. The special character of any course of study may be indicated by adding to the degree the name of the department, as: Bachelor of Science in Mining, or Bachelor of Science in Chemistry.

Each candidate for graduation is required to present an acceptable thesis embodying the results of a special study of some subject within the range of the course pursued. The subject of the thesis must be submitted for the approval of the faculty not later than the opening of the second semester of the Senior year, and the completed thesis must be presented not later that three weeks before commencement day.

The advanced degrees of Master of Science and Master of Arts will be conferred upon Bachelors, graduates from this University or from institutions of equivalent grade, who have successfully pursued at the University a course of study marked out by the faculty and requiring not less than one year.

COURSES OF INSTRUCTION.

The following schedule shows the courses in which instruction is offered. The courses themselves are explained in the Annual Register.

Military science and tactics or physical culture is required during the Freshman and Sophomore years. If for any reason a student is excused from these exercises, an additional subject having a minimum of three recitation hours per week will be required.

Numbers within parenthesis indicate hours of recitation per week; when no number is given five hours per week is understood.

Numbers outside parenthesis are the numbers of the courses.

FRESHMAN YEAR.

Military Science and Tactics (4).
Physical Culture (4).
English 1, 2.
Mathematics 1, 2.
Latin 1, 2.
French 1, 2.
Oratory 1, 2 (2)
German 1, 2.
Spanish 1, 2.
History 1, 2.
Botany 1, 2.
Artistic Drawing 1, 2.
Shopwork and Drawing 1, 2.
Chemistry 1, 2.

SOPHOMORE YEAR.

Military Science and Tactics (4).
Physical Culture (4).
English 3, 4 (3)
Mathematics 3, 4.
French 3, 4 (4).
Latin 3, 4 (4)
German 3, 4 (2).
Oratory 3, 4 (2).
Spanish 3, 4 (4).
Botany 3, 4.
Chemistry 3, 4.
Chemistry 9, 10.
Mineralogy 3.
History 3, 4 (2).
Engineering 1, 2.
Physics 1.
Shopwork and Drawing 3, 4.

JUNIOR YEAR.

Military Science and Tactics (4).
Physical Culture (4).
English 5, 6 (3).
English 7, 8 (2).
Mathematics 5, 6.
Economics 1, 2 (2).
Economics 3, 4 (3).
Zoology 1, 2.
Mineralogy 1, 2.
History 5, 6 (3).
History 7, 8 (2).
Chemistry 5, 6.
Engineering 3.

SENIOR YEAR.

Military Science and Tactics (4).
Physical Culture (4).
English 9, 10 (2).
English 11, 12 (3).
Psychology 1.
Pedagogy 1.
History 9, 10 (3).
Astronomy and Geology 1, 2.
Logic 1.
Logic 2.
Ethics 1 (3).
Chemistry 7, 8.
Engineering 4.
Engineering 5, 6.
Engineering 7, 8.

AGRICULTURAL COURSE.

To obtain the degree of Bachelor of Science in Agriculture, the following course is required:

FRESHMAN YEAR.

English.
Modern Language.
Higher Algebra.
Solid Geometry.
Trigonometry.
Shopwork and Drawing.

SOPHOMORE YEAR.

Higher Algebra.
Meteorology.
Surveying.
Drawing.
Soil and Irrigation.
Analytic Geometry.
Chemistry.
Botany.
Farm Equipment.

JUNIOR YEAR.

Farm Crops.
Botany.
Zoology.
Floriculture.
Forestry.
Breeds of Live Stock.
Anatomy.
Entomology.
Landscape Gardening.
Horticulture.

SENIOR YEAR.

Stock Feeding and Breeding.
Veterinary Medicine.
Fruits and Fruit Culture.
Dairying.
Geology.
Vegetables and Vegetable Culture.

SHORT COURSE OF INSTRUCTION IN MINERALOGY AND ASSAYING.

In order to meet the needs of persons who desire to learn the art of assaying the common ores, and who have not the time required for a full four years' course of study, the Board of Regents has approved a short course of instruction in practical assaying, mineralogy, metallurgy and allied subjects.

This course commences with the first semester in each year and requires at least two years; students are advised, however, to take the regular course in engineering and mining, if possible, since in two years they cannot expect to make more than a beginning in these subjects.

REQUIREMENTS FOR ADMISSION.

Those desiring to take this course are required to be at least eighteen years of age, to have good health, and to have a knowledge of English, mathematics and elementary science sufficient to enable them to pursue the course with advantage. For elementary science, physics and for mathematics, algebra to quadratics is sufficient.

Instruction is gratuitous, but each student is required to pay a matriculation fee of five dollars and to pay the cost of materials, glassware, and apparatus used by him.For this purpose a deposit of ten dollars will be required in advance each semester and any balance will be refunded.

The right is reserved to vary this course according to the aptitudes or necessities of those concerned.

FIRST YEAR.

General Chemistry, one semester.
Qualitative analysis, one semester.
Mathematics, two semesters.
English or Spanish, two semesters.
Practical free-hand drawing and shopwork, or physics, two semesters.

SECOND YEAR.

Mineralogy and blow-pipe analysis, two semesters.
Assaying, one semester.
Quantitative analysis and wet assaying, one semester.
Mathematics, two semesters.
Geology, two semesters.

COURSE OF STUDY SUB-COLLEGIATE DEPARTMENT.

The following course of study will be required of all students who fit themselves at the University for entrance to the Freshman class in 1903. Such variations from it will be made during the next year as will adapt it to the case of students already in the sub-collegiate department.

Military drill or physical culture is required of all able-bodied students throughout the course.

FIRST YEAR.

English and English Reading	7	Elementary Science	5
Commercial Arithmetic	3	Drawing and Shopwork or Domestic Science	5
American History	2		

SECOND YEAR.

English and English Reading	4	*Latin	5
Algebra	5	*Agriculture	5
*Bookkeeping	5	Drawing and Shopwork or Domestic Science	5
General History	3		

THIRD YEAR.

English and English Reading	5	*French	5
Plane Geometry	5	*Spanish	5
Civics	2	*German	5
Parliamentary Practice	1	*Stenography	5
*Physiology ½, Chemistry ½	5	*Drawing and Shopwork or Domestic Science	5
*Latin	5		

FOURTH YEAR.

English and English Reading	6	*French	4
Algebra ½, Higher Arithmetic ½	4	*Spanish	4
Parliamentary Practice	1	*German	4
*Physics	5	*English History	3
*Latin	4		

Numerals indicate number of recitations per week. Subjects marked * are elective. Two subjects from the electives must be chosen each year for the last three years.

Detailed descriptions of all these courses are given in the annual register and in the reports of the heads of departments which follow.

Besides the above work of instruction the University carries on two lines of work. The Agricultural Experiment Station is a department of the University devoting its time to the investigation of problems connected with the agricultural development of the Territory. In as much as the Station is required to make a separate report to the Governor only a summary of their work is appended, reference being had to their report for the last year.

In accordance with the act of the Legislature of the Territory approved March, 1897, a Bureau of Mines and Assaying was established as a part of the University. The report of the Director of the School of Mines contains a full statement of the work of this Bureau.

BUILDINGS AND GROUNDS.

The University grounds comprise forty acres. Under the direction of Mr. S. P. Greenleaf, the efficient Superintendent of Grounds, the general appearance of the campus has been greatly improved. the lawns have been kept in better condition and progress made toward making the campus a model for this section. We are handicapped by the lack of sufficient water. It is also becoming evident that the present grounds will be soon inadequate for the purposes required and the purchase of the addition already negotiated for should be consummated at once. The land around the University is rapidly advancing in value and we will never again have so good an opportunity to make an addition which will soon become imperatively necessary. A new and more ornamental fence about the grounds is greatly needed.

The buildings include University Hall, Manual Training Building, the two dormitories, North Hall and South Hall, Dining Hall, Mill building, Domestic Science Cottage, Greenhouses, pump house, barn and three cottages. The Dining Hall has been built during the past year. It is a handsome brick structure 104x40 feet, one story, containing dining room with a capacity for seating 210 people, kitchen, laundry and store room in the basement. This building cost complete with equipment $7,475.49. The completion of the building has met a long felt want. The appropriation for a library and museum building having become available by the approval of Congress, work will be commenced upon it at once. This will relieve the pressure on University Hall, where all the recitation rooms and laboratories are at present located. The University greatly needs a fire proof Science Hall where all the laboratories could be placed. It needs also an assembly room or Auditorium. There is no room in the present University Hall large enough to accommodate more than 200 people. All the public exercises must be held in town which results in a loss of University spirit, while the cost of securing a hall often prevents having lectures and other entertainments which would be of great value to the students.

The generous gift of $5,000 from Prof. James Douglas, President of the Copper Queen Mining Company, for a gymnasium is hailed with joy by all interested. This gift was obtained through the kindly interest of Col. William Herring, former Chancellor of the Board of Regents, whose continued interest in the institution merits our highest commendation. This sum will be sufficient to erect the building, but a small appropriation should be made for equipping the building with the necessary apparatus.

CHANGES AND IMPROVEMENTS.

During the past year a complete system has been installed for lighting the University Buildings and grounds by electricity. This (besides the added convenience) has greatly reduced the danger from fire.

It was found to be absolutely necessary to have more room for the chemical laboratories. During the vacation, a part of the cases containing the Herbert Brown collection of birds were moved from the room used as a museum and stored in a small vacant room. The botanical laboratory was then moved into a part of room D, heretofore used as a museum, and the rooms formerly occupied by the botanical laboratory were refitted for chemistry, thus giving the entire upper floor of the south wing to the chemical laboratory. Upon the completion of the museum building the whole of room D will become available for the botanical laboratory.

A rearrangement of the assignment of work to the instructors has reduced materially the amount paid for salaries. A still further rearrangement should be possible at the end of the year. In the President's office four new sets of books have been opened, the card system of records has been introduced wherever practicable and systematic records kept of everything pertaining to the internal management of the University, requests for catalogues, information, etc.

FUNDS.

Inasmuch as there seems to be much misapprehension as to the source of the funds by which the University is supported the following statement is made. There are six funds for the support of the University.

I. The Agricultural Experiment Station Fund consists of $15,000 per year and is received from the United States Government. This must be used entirely for the support of the Experiment Station; none of it can be used for instruction. The Experiment Station also derives a small revenue from the sale of produce which is used in purchasing supplies for laboratory and farm.

II. The Morrill Fund, $25,000 per year received from the United States Government. This fund can be used only for the purposes specified in the law creating the fund, viz: "Only for instruction in agriculture, the mechanic arts, the English language and the various branches of mathematics, physical, natural and economic science, with special reference to their application in the industries of life, and to the facilities for such instruction." According to instructions from the Department of the Interior the expenditures are listed under Agriculture, Mechanic Arts, English Language, Mathematical Sciences, Natural and Physical Sciences, Economic Sciences. None of this can be used for buildings, for the salary of the President, or for the clerical or executive offices, or to meet the running expenses of the University. It does pay, however, all the salaries of professors and instructors with one exception.

III. The University Fund, arising from the three-fifths mill tax levied in accordance with paragraph 3652, Section 1, of the Revised Statutes of Arizona. This is used for building and repairs, to pay all executive and clerical work, the salary of the Regents and teachers of languages, the running expenses of the University as shown by exhibit A.

IV. The Mess Fund. This arises from the sum of $16 per month paid by each resident in the dormitory, and is used exclusively for the care of the dormitories and the support of the dining hall.

V. The Contingent Fund. This arises from the fees paid by the students and from the rent of the cottages. It is used to replace materials used by the students in the laboratories, and to keep the cottages in repair.

VI. The Assay Fund. This arises out of the fees received from the commercial assaying and is used for the payment of the assayer and the material used in assaying.

Annexed to this report as Exhibit A will be found the report of the receipts and disbursements of the various funds of the University, including the pay roll.

I would call your attention to the reports of the Directors of the Agricultural Experiment Station and the School of Mines and the various heads of departments. These contain a summary of the work done in each department during the year.

RECOMMENDATIONS.

I would respectfully submit the following suggestions and recommendations summarized from the foregoing report and the reports of the heads of departments:

I. The most pressing need at present is a new mill building. I quote from my report of last year: "The present mill building has become absolutely useless for any purpose which can benefit the University while its situation attached to University Hall is a menace in case of fire and greatly increases the cost of insurance. The mill should be torn down and a new and modern mill erected at some convenient point. I am confident that if such a mill were built manufacturers would furnish the necessary machinery at comparatively little cost to the University. The growing importance of our mining course makes a modern and well equipped mill a practical necessity if we are to hold our own with other schools." This building is needed before the close of the present school year. One course, that on ore dressing, can not be given without it. See also report of the Director of the School of Mines.

II. A special appropriation of $5,000 is needed for furnishing the new library and museum building and the gymnasium.

III. An appropriation is needed for the purchase of more land for the use of the University.

IV. We need an hydraulic laboratory. See report of Professor of Engineering.

V. A new and more ornamental fence about the University grounds is needed.

VI. We need an Assembly Hall or Auditorium Building. Reasons for this are given elsewhere.

VII. We need a Science Hall in which all the laboratories could be placed.

VIII. An appropriation should be made for the support of the museum. Several valuable collections of archaeological specimens have been offered to us at a very reasonable rate. If we do not take them they will go out of the Territory, a result greatly to be deplored. No money is available from present funds to add to the collections.

In general the year has shown decided progress in all lines. Courses have been strengthened, and there has been greater efficiency in the teaching force. The students who have entered have shown better preparation and the general tone of the student body has been most commendable. There has been a noticeable absence of all hazing or rowdyism and a distinct growth of college spirit. The internal administration and discipline has been without friction, everything showing a quiet but steady growth. I desire to acknowledge my indebtedness to my colleagues for their fidelity and zeal in their various departments. The University is a living organism and all its parts must work in perfect unison and under one common inspiration if the best results are to be accomplished.

I desire also to express my grateful appreciation to the Board of Regents for their courtesy and helpfulness.

All of which is respectfully submitted,

F. Yale Adams,
President.

EXHIBIT A.

STATEMENT OF MORRILL FUND.

Ending June 30, 1902.

Balance on hand July 1, 1901	$ 1,785.76
Receipts from U. S. Government	25,000.00
Total	$26,785.76

DISBURSEMENTS FOR THE YEAR.

Expenditures from June 30, 1901, *to June* 30, 1902.

AGRICULTURAL AND MECHANICAL ARTS.

Salaries of Instructors	$ 3,971.01
Apparatus, Machinery, etc	2,546.70
Text books and reference books	240.97
Total	$ 6,758.68

ENGLISH LANGUAGE.

Salaries of Instructors	$ 4,128.77
Text books and reference books	905.04
Total	$ 5,033.81

MATHEMATICAL SCIENCE.

Salaries of Instructors	$ 3,879.72
Text books and reference books	......
Apparatus	2.40
Total	$ 3,882.12

NATURAL OR PHYSICAL SCIENCE.

Salaries of Instructors	$ 5,985.68
Text books and reference books	110.69
Apparatus, Machinery, etc	2,042.00
Total	$ 8,138.37

ECONOMIC SCIENCE.

Salaries of Instructors	$ 2,715.60
Text books and reference books	4.47
Apparatus	41.36
Total	$ 2,761.43

Summary—

Agriculture and Mechanic Arts	$ 6,763.65
English Language	5,033.81
Mathematical Science	3,882.12
Natural or Physical Science	8,138.37
Economic Science	2,761.43
Total	$26,579.38

EXPENDITURES BY SCHEDULES AND DEPARTMENTS FOR THE YEAR ENDING JUNE 30, 1902.

		Administrative.	*Agriculture and Horticulture.*	*Animal Husbandry.*	*General Farm Expenses.*	*Botany.*	*Chemistry.*	*Etomology and Meteorology.*	*Date Palm Orchard.*	*Sugar Beet Culture.*	*Miscellaneous.*	*Totals.*	
$ 15,000.00 U. S. Appropriation.	Salaries	821.78	1800.00	1599.96		854.14	2338.70	100.00				7514.58	
	Labor	216.47	1312 40	1058.63		435.57	130.10	36.80	252.75	114.15	75.00	3631.87	
	Publications	510.27	306.39	126.59		60.09	101.79	76.04	.75			1181.92	
	Postage and Stationery	240.44	3.45	2.65		4.74	4.87		1.45			257.60	
	Freight and Express	87.68	87.08	6.82		7.05	98.78	.95	32.36	13.52		334.24	
	Heat, light and water					56.03	56 33		12.00			124.36	
	Chemical supplies	.25		.45		.50	234.77					235.97	
	Seeds, plants and sundries		128.01	19.22		12.85	4.30		2.65	.60		167.63	
	Fertilizers				235.85				21.77			257.62	
	Feeding Stuffs		5.50	38.50	123.98	1.85						169.83	
	Library	42.63				.75						43.38	
	Tools, implem'ts and mch'y	1.15	169 04	51.07	100.35	1.60	5.45		3.50	.25		332.41	
	Furniture and Fixtures	272.98			3.50		9.40		3.50			289.38	
	Scientific apparatus		19.00		.50	6.09	20.30	18.10				63.99	
	Live Stock		2.00	23.25								25.25	
	Traveling expenses	80.60				2.45	2.21	18.90	93.70			197.86	
	Contingent	35.00				20.00	45.00					100.00	
	Building and repairs	.05	2.35	36.78	32.93							72.11	15000.00
Sales fund and overdraft.	Live stock			705.65								705.65	
	Traveling expenses	25.55		10.00		67.18	71.69			51.50		225.92	
	Building and Repairs	10.88	14.71	149.90	34.54				1.05			211.08	1142.65
Territorial fund.	Fencing Station farm		248.63	292.52								541.15	
	Office work	354.11										354.11	
	Telephone service		6.25	6.95	18.70				13.20			45.10	940.36
	Total cost of departments	2699.84	4104.81	4128.94	550.35	1530.89	3123.69	250.79	438.68	180.02	75.00		17083.01

STATEMENT OF THE TERRITORIAL FUND.

YEAR 1902.

Receipts		$23,032.55
Disbursements for the year—		
Salaries	$ 4,290.79	
Labor	3,173.27	
Per diem and Mileage, Regents	932.20	
Printing and Stationery	470.06	
Material and Supplies	181.36	
Fuel, Lights	601.75	
Freight and Express	256.71	
Furniture and Fixtures	736.72	
Building	7,344.09	
Painting and Repairs	1,917.93	
Apparatus	114.53	
Insurance	664.00	
Library	94.15	
Contingent	1,074.74	
Experiment Station, Salary	500.00	
Experiment Station, Fencing	550.00	
Experiment Station, Telephone	130.25	
	$23,032.55	$22,032.55

CONTINGENT.

Receipts	$ 1,680.52
Disbursements	539.96
Balance	$ 1,140.56

ASSAY.

Receipts	$ 2,076.67
Disbursements	2,023.17
Balance	$ 53.50

MESS.

Receipts	$ 9,910.41
Disbursements	9,156.48
Balance	$ 753.93

NAME.	POSITION.	SALARIES PER YEAR.		
		MORRILL.	TERRITORIAL.	EXP.STA.
F. Yale Adams	Pres., Polit. Econ	$1,800.00	$1,700.00	
W. P. Blake	Geology, Direct. S. M.	2,000.00		
R. H. Forbes	Direct. Exp. Sta			2,000.00
H. J. Hall	English, Librarian	1,800.00		
S. M. Woodward	Mathematics	1,800.00		
F. N. Guild	Chemistry	1,800.00		
D. H. Holmes	Shop, Drawing	1,800.00		
G. E. P. Smith	Engineering, Physics	1,800.00		
J. J. Thornber	Botany	400.00		1,000.00
Nora Towner	Stenographer, Secr'y	420.00	540.00	
Mabel G. Hoover	Domestic Economy	900.00		
Hattie Ferrin	English	1,000.00		
Alice O. Butterfield	Phys. Cul., History	720.00		
J. W. Gorby	Oratory	420.00		
Marion C. Stanley	Latin, Eng., Matron	540.00	180.00	
J. M. Patton	Mil., Sci., Fr., Ger.,Span.		1,200.00	
J. S. Mann	Assist. Chemistry	160.00		
G. M. Evans	Mathematics, Registrar	297.50	45.00	
B. F. Stacey	Phys. Geog	212.50		
E. J. Hollingshead	Hist., Bookkeeping	382.50		
A. J. McClatchie	Exp. Sta.			1,800.00
G. H. True	Exp. Sta.			1,650.00
W. W. Skinner	Exp. Sta.			1,200.00
W. O. Hayes	Exp. Sta.			1,080.00
T. E. Steele	Chem. Lab. Assist	127.50		
F. C. Kelton	Shop Assist	127.50		
E. H. Jones	Chem. Lab. Assist	127.50		
R. L. Drane	Surv. Assistant	63.75		
E. Jones	Carpenter		240.00	
Assist. Carpenter			40.00	
S. P. Greenleaf	Foreman		900.00	
Santos Higuera	Laborer Exp. Sta			600.00
Serapio Robles	Laborer Univ. grounds		420.00	
Pascual Moreno	Janitor		510.00	
B. G. Suarez	Janitor Domestic Econ	25.00		
C. E. Chase	Engineer	360.00	588.00	72.00
A. J. Shamblin	Exp. Sta.			600.00
G. Y. McClatchie	Exp. Sta.			600.00
John Forrester	Exp. Sta.			600.00
John Ludt	Exp. Sta.			360.00
Roy G. Mead	Exp. Sta. Chem. Lab. Asst.			300.00
	MESS.			
Fred Horiuchi and four assistants		1,785.00		
W. Skinner	Manager	132.50		
M. Calderwood	Janitor N. Hall	120.00		
V. Bayless	Janitor N. Hall	120.00		
B. G. Suarez	Janitor S. Hall	80.00		
B. M. Stanley	Bookkeeper	120.00		
	ASSAY.			
J. S. Mann	Assayer	1,040.00		
One assistant	Crushing ore	75.00		

REPORT OF THE UNIVERSITY OF ARIZONA AGRICULTURAL EXPERIMENT STATION.

Agricultural Experiment Station,
University of Arizona.
Tucson, Arizona, December 20, 1902.

F. Yale Adams, A. M.,
President University of Arizona.

Sir: During the past two years the work of the Agricultural Experiment Station has been characterized by quiet progress in all departments along well defined lines of investigation, which now include the study of agricultural moisture conditions as affected by climate and farm management; the testing of new varieties of crop plants with reference to their behavior under arid conditions; date palm culture; composition of crop plants and forages; the water requirements of crops, their tolerance of alkali, and their commercial possibilities: the methods of irrigation and culture for the semi-arid region; methods of feeding for meat and milk production; grazing range investigations, and the study of irrigating waters with reference to their character and effects upon agricultural soils.

The different departments engaged upon these topics of investigation, though distributed for the sake of most advantageous study at Tucson, Tempe, and Phoenix, have been knit together during the past year by telephone, so that, as far as possible, communication may be had between the different branches of our service in emergency.

Upon these lines of organization and study the Station has gradually increased the efficiency of its investigations, which in subject matter are of eminently practical character, and in written form are so popularized as to make the results of the greatest usefulness to the farmer.

Since Jan. 1st, 1901, the Station has issued eleven bulletins, containing 432 pages of carefully written information relating to Southwestern agriculture. A considerable part of this matter first appeared in the form of short articles known as Timely Hints for Farmers, of which eighteen have been issued during the two years. These, by virtue of their timeliness, brevity, clearness, and practical character, have very greatly increased the popularity and usefulness of the Station.

Some of the more salient features of the Station work at the present time may be mentioned more in detail:

With reference to crop production, the department of agriculture, in care of Professor McClatchie, is engaged in the study of those horticultural varieties and methods of culture best suited to an arid subtropical climate and irrigated conditions. Attention has been given to such subjects as the culture of vegetables, the different varieties of Eucalyptus suited to this region, strawberries, Egyptian cotton, and miscellaneous other agricultural plants and cultural varieties. Especial attention has been given to the study of climatic conditions affecting growth in Salt River Valley, including rainfall, temperature, and evaporation.

A feature of cultural work has been a study of those methods of irrigation calculated to secure the greatest usefulness from available water supply, a subject which is second in importance only to the development of water for irrigation purposes.

Date palm culture warrants continued interest as a result of the promise and prosperity of cultural operations carried on near Tempe in co-operation with the United States Department of Agriculture. The date palm orchard now contains 556 living imported tree sfrom the Sahara, Egypt, Arabia, and Beluchistan, comprising 81 different varieties. A small crop of fruit was secured this year from suckers imported two years ago; and from this time on, as different varieties come into bearing, the undertaking will be watched with increasing interest in the semi-arid Southwestern country adapted to date palm culture.

Experimental work with sugar beets, carried on for the last five years in the Salt and Gila River valleys, and elsewhere, has been brought to completion and laid aside, with the result that it has been shown that beets of excellent quality and satisfactory tonnage may be produced in the irrigated valleys of Southern Arizona.

The department of animal husbandry, under Professor True, after the acquisition of additional land two years ago, has rapidly increased in the usefulness and variety of its work. Of especial interest is the comparative feeding test, by different methods, of two lots of Hereford steers, one lot being fed alfalfa only, while the other lot received other foods in combination with alfalfa. The final digest of this work will bear upon the discussions relating to feeding methods best suited to Southwestern conditions.

The dairy herd has been productive not only of revenue, but of valuable data relating to dairying in this region. In particular, the value of knowledge of individual cows has been shown, since systematic tests often show that appearances are very deceptive as to the actual profitableness of different cows.

Pigs and sheep have also found a place in this interesting work, which, though only three years old, has already become one of the leading departments of the Station.

Of much general interest is the work in range improvement, which, with the co-operation of the United States Department of Agriculture, has during the past two years become one of our major subjects of study. During the year a co-operative arrangement with the Department of Agriculture has been perfected by which means have been provided for fencing a large representative tract of about fifty-three square miles of range country south of Tucson. It is proposed to keep this tract under control and observation for some years, in order to gather accurate data relating to the changes which transpire upon our public grazing lands through the operations of the cattle industry, the methods best suited to the reclamation of overgrazed ranges, and the proper scheme of administration by means of which the range may be legitimately made use of without excessive destruction of its utilities. This is a subject of study the general results of which are applicable to the immense areas of Western public lands, aggregating some 500,000,000 acres, between the Canadian and Mexican boundaries. It is not believed that the heretofore careless and wasteful administration of these great utilities will be indefinitely continued, but that improved administration of them waits only upon the ascertainment of proper scientific and economic knowledge for the guidance of those who must in time improve a condition which now amounts to little less than a public calamity.

Technically, in this connection, Professor Thornber of the department of botany, is making a study of conditions affecting plant growth on the ranges, and of varieties of plants from the arid regions of foreign countries possibly to be found useful here.

The chemists of the Station, Professors Forbes and Skinner, have for the most part been busy, with a study of subjects relating to the operations of the other departments. A study of the irrigating waters of the Territory has been brought to completion, and has proved not only to be of great interest in itself, but to have been suggestive of many new lines of inquiry. It is reassuring to know that the waters of our Southwestern irrigating streams, with their loads of silt, possess great fertilizing value: the Colorado River, for instance, during the year of observation, carried from 53 cents to $3.09 per acre foot of value in nitrogen only. On the other hand, a knowledge of the salt content of irrigating waters gives timely warning of the future, and forearms the agriculturist in the use of such methods as will safeguard him against accumulation of salts in irrigating from a stream containing dangerous quantities of these salts in solution. The qualities of the Colorado, Salt, and Gila rivers, both as to their salt and silt contents, have been carefully studied and pointed out in the published reports of this work.

Upon the plan of study stated above, the Station is endeavoring to fulfill the law of its being, which, according to the Hatch Act, is "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science."

This work, which is primarily one of agricultural *investigation,* is the precursor of that in agricultural *education.* The systematic knowledge of the new and comparatively untried agricultural conditions of the Southwest, through the efforts of the arid regions' Experiment Stations, is increasingly valuable for an educational work which has not heretofore really been possible here.

It will be seen from the financial report that the Station farm, including the departments of agriculture and horticulture and animal husbandry, has received about half the appropriations, the remaining half being divided between the offices and laboratories at Tucson and the date orchard at Tempe.

Respectfully submitted,
R. H. Forbes, Director.

REPORT OF THE ARIZONA SCHOOL OF MINES.

Arizona School of Mines,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report of the work of the Arizona School of Mines for the year 1902:

The Territorial enactment establishing the "University of Arizona" provides (Sec. 10) "The Uinversity shall consist of five Departments."

The fifth of these divisions or departments was designated as "The Department of Mineralogy and the School of Mines." This fifth department was established by the Board of Regents October 19, 1890, and a director was appointed. But this department then, as now, being without direct endowment instruction has been given by the University professors and instructors, who are paid by the United States out of the income from the Agricultural College and Experiment Station funds. No provision has yet been made for the direct support of the School of Mines, or for the salary of the Director and the professors.

The work of the School of Mines may be conveniently considered under five chief headings or divisions:

I. Instruction.
II. Investigation.
III. Testing and Assaying.—Bureau of Mines.
IV. Mill work and metallurgy.
V. Museum.

I. INSTRUCTION.

There are two classes of students in the School of Mines. 1, Those who, with suitable preparation, take the regular courses of study leading to a degree; 2, those who take partial courses only, or take special studies without regard to a degree.

The greater number of the irregular or special students are young men desiring to become qualified as assayers for mining companies. It often happens that such students becoming better informed of the need of a more extended education, concluded to remain in the School for a longer period than the two years devoted to the short course in assaying.

The preparation of a scheme of studies in proper sequence for the best educational results, in other words, a fixed and regular course of study, or curriculum, for the students of mining and metallurgy, especially for those wishing a full four years' course of study, early engaged the attention of the

Director. This curriculum was adopted by the University and was announced in the Annual Register for 1895 and 1896.

In the preparation of this curriculum it was then sought, and has since been the aim, to economize the teaching force of the University by making the course of study for the first two years as nearly parallel as possible to the course adopted for the first two years of the course of study in engineering. Conformity to this curriculum is required of the students who intend to give the required four years of their time to take the degree of Bachelor of Science in mining. Provision is also made for a post graduate course leading to the degree of engineer of mines.

Both the regular and the special students have the privilege of attending the lectures of the University professors, and have the advantage of the University equipment, the collections, apparatus and the library.

The instruction in general and applied chemistry and in mineralogy has been given by Professor F. N. Guild and his assistants. The laboratories for chemical analysis, metallurgy, and assaying have been filled during the year and the increasing numbers of students have required increased accommodations and apparatus.

Instruction in mathematics, physics, and mechanics, has been given by Professors Woodward and Smith. Civil and mine engineering have been taught by Professor Smith.

Drawing and shop-work, including working in iron, steel and wood, have been studied in the new building fully equipped with modern machinery under Professor Holmes.

Geology is taught by the Director as the Professor of Geology in the University, in a series of daily lectures. A special course has been given upon Mineral deposits and veins, illustrated largely by examples from the Pacific States and Northern Mexico. Mining machinery and methods of mining have also been special subjects of attention and instruction by the Director of the School.

At the request of the Secretary and Council of the American Institute of Mining Engineers, the Board of Regents granted leave of absence to the Director from September 20th until November 1st, 1902, in order to enable him to attend the meeting of the Institute held in New Haven, Connecticut, in October to present an illustrated paper upon the invention of the Blake Stone and Ore Breaker and its application in various industries. This machine, the invention of the late Eli Whitney Blake, LL. D., in its results is analogous to the invention of the Cotton Gin of Eli Whitney. The inventors were uncle and nephew; both were born in Westboro, Massachusetts; both graduated at Yale College; each gave to the world a labor-saving machine of the highest order and value. The Rock-Breaker has been of incalculable service in the mining industry by cheapening and increasing the production of the precious and other metals. This paper which will appear in the forthcoming volume of the Transactions of the Institute, was awarded the "Blake Stone Breaker Prize" by the Governing Board and Faculty of the Sheffield Scientific School of Yale University, November, 1902.

II. INVESTIGATION.

The paper upon deposits of diatomite and volcanic-ash referred to in my last report has since been published and distributed by the Institute of Mining Engineers. The deposit has stimulated inquiry from several sources, and it is probable that large quantities of this substance could be exported if the high cost of freight did not forbid it.

The Director of the School of Mines is still the recipient of many letters of inquiry regarding the nature and value of several little known minerals, such for example as fluor-spar, barite, vanadinite, wulfenite and molybdenite, samples of clay, kaolin, coal, and petroleum have also been submitted and examined.

As stated in the report for 1901, the correspondence of the Director of the School is voluminous and varied, and it is believed is not without useful results to educational work and to the University in its relations to the community. The School of Mines is very properly regarded as a source of reliable information upon the mineral wealth of the Territory, and letters reach it from all parts of the United States, eagerly seeking authoritative and, if possible, printed information upon the mining interests. Your Director, in addition to, and outside of, his regular duties to the University and to the School of Mines, has annually contributed a Report to the Governor of the Territory upon the mineral resources of Arizona, their extent, nature, distribution and value. All these reports of the successive Governors covering the contribution of the Territorial Geologists are in great demand, but are "out of print."

III. ASSAYING—BUREAU OF MINES.

The work of assaying for the public, according to the legislative enactment, has continued to be carried on independently of the instruction to the students of assaying and in a separate building erected for the purpose, a plan of which is shown herewith.

Mr. J. S. Mann has continued to discharge the duties of assayer and analyst. The work is not done by students.

The following tabular statement gives in a compact form the number and nature of the assays made and amount received and turned in monthly to the assay fund out of which the expenses for apparatus and materials, and the salary of the assayer, are paid; this department being self-sustaining, while contributing in no small degree to the educational work of the University.

SUMMARY OF WORK IN THE BUREAU OF MINES.

Month.	Fire Assays	Wet Assays.	Chemical Analyses.	Qualitative Analyses.	Museum.	Receipts.
1901						
Dec. 15 to 31	43	28	1	10	1	$ 147.00
1902						
January	53	15	..	26	6	64.75
February	145	53	..	28	7	150.50
March	224	44	6	33	1	300.00
April	105	42	4	75	6	210.75
May	37	34	2	24	4	75.00
June	24	13	1	10	..	57.00
July	38	7	..	13	..	60.00
August	40	17	..	19	..	57.50
September	35	10	2	17	..	31.00
October	40	4	2	19	1	50.00
November	51	19	..	20	2	63.00
December	80	25	..	25	2	108.00
Totals	915	311	18	319	30	$1394.50

Many of the young men educated in the School of Mines as chemists and assayers find useful and remunerative positions with mining companies or as assayers on their own account in the cities and mining camps of Arizona. Industry, application, sobriety and honesty are most important and appreciated factors, in addition to knowledge and skill in the art, which secure good positions for our graduates.

IV. MILL WORK AND METALLURGY.

The mill remains as it was last year. The shafting, belting, and machines are all good and in good order, but the foundations of the framework have settled so as to throw some of the shafts and pulleys out of line.

The mill should be removed and re-erected in a proper form upon the railway, where it would be more generally useful to the public and to the School of Mines alike. If well placed and cared for by a competent millman there is little doubt that makers of new and important machines would be pleased to avail themselves of an opportunity to place their machines upon exhibition and permit them to become a permanent part of the working plant. It is a mistake to regard the machinery as worn out or antiquated. The five-stamp mill made by Fraser & Chalmers is but little worn, and is ready for use, so also the Blake Rock-breaker is but little worn and is of the most approved pattern and construction. The Cornish Rolls are also of the best make and are in good condition, ready for use. All the machinery is available for a new mill, and if re-erected upon the railway and so made accessible to miners and prospectors without the added cost of one dollar a ton for carting the ore from the railway to the mill it is probable that its help would be often sought. There is reason to believe that many consignments of ore requiring working tests would be sent to such a mill rather than consigned to Denver or New York. Attention is respectfully directed to my communication on the subject of the reconstruction of the mill made to the Board of Regents, and to the offer of the firm of Gardiner, Worthen & Goss to move and erect the plant on a site accessible by a railway siding in Tucson and convenient to the School of Mines.

V. MUSEUM.

There has been continued growth in the extent and importance of the collection of rocks, ores, and fossils illustrative of the history of the formation of the mountains and plains of Arizona, and of the extent and geographic distribution of its mineral wealth.

The following from the last annual report may be repeated:

"The Director has availed himself of all opportunities of collecting specimens of ores and minerals when visiting mines and has added a great number of specimens to the collection, valuable to the University not only as representing the mineral wealth of Arizona, but as illustrative material essential to the proper instruction in Geology." The proper determination of the exact nature of the specimens and their labeling, recording and cataloguing requires much time and attention. Specimens when received are numbered with the current numbering of the samples and specimens received by the Bureau of Mines so as to avoid any duplication of numbers or entries. And very often specimens for the museum are sent in with the samples on which assays are desired, so that the numbers indicate both the sample assayed and the specimen for the Museum. The importance of a card catalogue of the specimens is becoming more and more important in view of the construction of a new building for the museum collections, and the constantly accumulating accessions.

Hundreds of specimens of value are now kept in trays and are comparatively inaccessible. Many new mineral cases will be required for the new building, in order to display these collections.

Amongst the other important additions to the collection the following may be mentioned: No. 5399. A group of wulfenite crystals (wulfenite) from the Mammoth Mine, Pinal County, presented by Fred. J. Snyder. This is a mass of large brilliant crystals showing alike on all sides and standing about six inches high.

Many large and finely formed masses of silicified wood of a brown color from the vicinity of Yuma, Arizona, collected by Mr. Herbert Brown, No. 5377; a large mass of ore and quartz crystals from the wall of the Cash Mine vein, presented by Mr. Harington Blauvelt, Mining Engineer; Scheelite from the Maudena lode, by Captain Burgess; specimens of archaeological interest from Mr. J. E. Drane of Mesa; suite selected specimens from the mines of the Green Consolidated Company at Cananea, Sonora, Mexico, presented by Mrs. Frank Proctor. Specimens showing metallic silver in films and flakes upon the ore from El Capote, La Cananea, Mexico, by Mrs. M. B. Aguirre. Rich silver ore from the World's Fair Mine, Santa Cruz County, presented by Mr. and Mrs. Powers. (No. 4482) Mr. Brown has, also, added largely to the archaeological and ethnological collections by many stone metates from Yuma County, and by a series of clay statuettes of Indian make showing the different ordinary and ceremonial costumes of the Yuma Indians. He has also sent in a representative series of objects from the existing Indian villages and tribes, and from the ancient cliff dwellings. Such dwellings are being rapidly despoiled of all objects of historic interests by commercial collectors and vendors, by whom many valuable objects are lost by breakage or by dispersion into the possession of mere curio hunters.

A rare and important opportunity to add largely to the representative collection of the mineral riches of Arizona is offered by the required representation of the territory at St. Louis at the approaching international exhibition. By a combination of knowledge and effort a more systematic and well described collection could be sent to the exhibition with the expectation of its being returned and placed permanently in the Museum. The value of such a collection depends largely upon its accurate description and labelling.

Respectfully submitted,

WM. P. BLAKE, Director.

REPORT OF THE DEPARTMENT OF GEOLOGY.

Department of Geology,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit my report as Professor of Geology, Metallurgy and Mining for the year 1902.

The instruction in Geology is given chiefly by lectures illustrated by the collections in the Museum, by maps, photographs, models and by drawings on the blackboard. This instruction in the class-room is supplemented as far as practicable by field work.

The subject has been divided in treatment as follows:

I. GEOLOGY.

1. Astronomical introduction.—Cosmic—Relations of the earth to the sun and other bodies.
2. Geognostic. The materials of which the earth is formed.
3. Dynamic. Formation, alteration and movement of rocks.
4. Geotectonic. The building up of the world-structure.
5. Physiographic. Present features and conditions.

This general course on geology is supplemented by a special course upon economic geology especially adapted to the requirements of special students of mining and metallurgy.

II. ECONOMIC GEOLOGY.

1. Nature and classification of deposits of useful minerals and ores.
2. Special description of mineral veins, deposits and localities of the more common and useful metals, iron, manganese, copper, lead, zinc, gold and silver, especially as found upon the Pacific slope and in the Southwest.
3. Materials of construction; granite, sandstone, limestone, marble and other building material.
4. Coal and its topography and distribution.
5. Petroleum and Natural Gas.
6. Salt and other soluble substances.

III. METALLURGY.

1. The mechanical preparation of ores.
2. Chemical treatment of ores.
3. Smelting and refining.
4. Electrolytic Separation.

These several subjects are treated by lectures, and as far as possible by experimental illustrations in the laboratories, and by the mill and its machinery.

A trip to the supposed oil region east of Tucson was made and participated in by several of the regular and special students. This gave an opportunity to study the occurrence of the stratiform rocks, in place, with the sequence of anticlines and synclines, the intrusion of plutonic rock, and the underlying foundation-rocks of pre-Cambrian age.

It is hoped that this Department may soon have the use of a stereopticon and slides for illustrative work in connection with the lectures as urged by me in my Report for the year 1896 and yearly since that date.

We are also in great need of suites of fossil remains of the successive ages of the earth, and of such geologic or geotechtonic models as have been made to illustrate certain formations and districts of great educational importance.

I, also, urge the need of a suitable lecture room. It would greatly improve the efficiency of the Department of Geology.

Respectfully submitted,
WM .P. BLAKE,
Professor Geology, Metallurgy and Mining.

REPORT OF DEPARTMENT OF ENGLISH.

Department of English,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to make the following report of the English department of the University from January 1, 1902, to December 31, 1902.

A tabular statement of the amount and nature of the instruction in English, including the sub-collegiate classes follows:

During the present year the requirements for entrance to the Freshman class have been raised and are now uniform with those of the larger colleges and universities in the country. They include, together with a sufficient knowledge of composition and rhetoric, the following English classics:

For reading: Shakespeare, Merchant of Venice, Julius Cæsar; Addison, Sir Roger De Coverley Papers from the Spectator; Tennyson, The Princess; Lowell, Vision of Sir Launfal; Scott, Ivanhoe; Coleridge, Ancient Mariner; Goldsmith. Marner; Carlyle, Essay on Burns. Vicar of Wakefield; George Eliot, Silas

For thorough study: Shakespeare, Macbeth; Milton, L'Allegro, Il Penseroso, Comus, Lycidas; Macaulay, Essays on Milton and Addison; Burke, Conciliation with America.

We have been steadily raising the standard of English entrance requirements for several years with the above end in view, and are now successfully preparing the students in the sub-collegiate department upon all this work.

ENGLISH INSTRUCTION.

JANUARY-JUNE, 1902.

Sub-Collegiate.

Instructor Ferrin,	I	English—Comp., rhet., lit.,	39	students,	5	hour
" "	III	" " " "	37	"	2	"
" "	IV	" " " "	23	"	3	"
Instructor McGaughey,	I	English reading,	33	"	2	"
" "	III	" "	32	"	2	"
" "	IV	" "	18	"	2	"

Collegiate.

Prof. Hall, English	1, 2	19th Century Prose,	12	"	5	"
" "	3, 4	Rhetoric and Composition,	3	"	3	"
" "	9, 10	17th Century Literature,	4	"	2	"
" "	11, 12	19th Century Poetry,	4	"	2	"

SEPTEMBER-DECEMBER, 1902.

Sub-Collegiate.

Instructor Ferrin,	I	English—Grammar,	36	"	5	"
" "	II	English—Composition,	36	"	2	"
" "	IV	English—Comp., rhet., lit.,	36	"	3	"
" "	IV	English reading,	29	"	2	"
Instructor Stanley,	II	English reading,	20	"	5	"

Collegiate.

Prof. Hall, English,	1, 2	19th Century Prose,	23	"	5	"
" "	3, 4	Rhetoric and Comp.,	5	"	3	"
" "	5, 6	Elizabethan Literature,	9	"	3	"
" "	11, 12	19th Century Poetry*	15	"	3	"

*Including Saturday class.

The collegiate English need not be described in detail. Its purpose is t give a knowledge of English authors and their works from the Elizabetha times to the present; to trace the growth of literature in its varied forms; t study the changes of life and thought in the Anglo-Saxon race as shown in it literature; and to cultivate a taste for the best that has been written. The stud is conducted by means of lectures and recitations, and the works of the author themselves are made the text-books. The library has developed to such a extent that considerable investigation can be carried on by each student.

Courses are now so arranged that a student may in four years take all th English offered in the college department. Of the six courses, only four ar given in any one year, so that it is possible for one instructor to conduct all th classes.

Respectfully submitted,
HOWARD J. HALL,
Professor of English.

REPORT OF DEPARTMENT OF LIBRARY.

Department of Library,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to make the following report of the condition of the University Library on December 17, 1902, together with such matter as may be of interest in connection therewith:

Bound volumes, catalogued	6,031
Bound volumes, not catalogued (reports)	925
Total bound volumes	6,956

Bound volumes added this year	549
Outstanding orders, (est. vols.)	300
Pamphlets (est.)	12,000
Total cost of Library to University, including fixtures and card catalogue, but not including gifts (est. $225)	$12,045.14

The value of the Library to the University lies in the fact that it has been chosen with much care. The policy in buying books has always been to equip each department of the University as completely as possible without infringing upon the deserts of other departments. The library is therefore a working library for the students and instructors in each branch of University study and investigation. We are making it, as far as possible, a reference library. This necessitates the buying of expensive works and sets of works, and the collecting of complete sets of periodicals. In this last specialty the library, considering its size and age, is especially strong. We have at present thirteen complete and twenty-seven incomplete sets of bound periodicals in general science, engineering, botany, zoology, chemistry, education, history and social science. Nearly all periodicals of permanent value are bound as received, and one or two complete sets are secured each year.

It is a matter of great congratulation that the library is soon to be housed in a new building where the present danger from fire will no longer be a menace.

Attention must be called to the fact that money will shortly be needed for furnishing the new Library. The $25,000 appropriated by the last Legislature for building will all be needed in the structure itself, since it is planned to house under one roof the Library, the Museum, and the executive offices of the University. The need is all the more pressing, since the prices of materials and labor have risen greatly since the original appropriation was made.

In respect to the Library, the furniture required will be tables, chairs, desks, book cases, book stacks, filing cases and catalogue cases. All the furniture must be of the quality and style required for special library use, and as far as possible should be fire proof. Both wall cases and book stacks should be of metal throughout. A complete heating and ventilating system must be provided for the new building, and that all danger from fire be removed, the boiler or heater itself must be outside the building. All this will require an expenditure of at least $5,000 in addition to the amount already at hand.

I would call your attention to the great desirability of establishing in connection with the University a system of traveling libraries, such as exists in at least nineteen older states. In this day of books and libraries no argument is needed to show the utility of circulating books among the people at large, and of bringing reading directly to the home. The traveling library system would involve the creation by the Legislature of a library commission of three or five persons or the constituting of a Board of Regents as such;

this commission to serve without pay and to expend the funds given it by the territory. It would be their duty to buy books and send them out in small collections, for a limited time, to communities applying for them, and to keep them in constant circulation.

To illustrate: A library of 25 volumes, packed in a box which would also serve as a book-case, would be sent to one community applying for it in each county. After six months this library would be returned to the University and another of 25 volumes sent in its place. The first library would then be sent into another county and so on around the territory, till the books were worn out. It would take several years to go around. These libraries might be (1) general, including such subjects as education, sociology, science, applied science, literature, biography, travel, history; or (2) selected, on request of the community applying for them, on any subject of study, as art, history, travel, sociology, science, literature.

The communities applying for the books would pay all transportation charges and a small fee for wear and tear, say $5 each year. During the second year the annual appropriation would furnish a second library in each county, and during the third year a third library, till the money would be no longer sufficient to buy new libraries, but would all be required to keep up those in circulation.

Some reasons for establishing a system of traveling libraries are:

(1) In a sparsely settled country like our own territory it is impossible for people to get good books to read unless they buy or rent them.

(2) The University should make all possible efforts to extend its work to the benefit of all the people, and could with the greatest propriety and with little expense reach many communities, find their needs and supply these, and thus come into closer practical touch with home wants.

(3) Through women's clubs, societies, guilds and fraternities that undertake some form of study, the University could spread its influence by promoting a popular kind of education that is greatly in demand.

(4) Young people especially could be reached, at first through books, with the hope and reasonable expectation that their ambition would be aroused to seek the advantages of the University. Many people would be brought into sympathy with the whole University, if they should find that through books it supplies some one of their needs. The University would reach through this means the very class of people it wishes to reach and can most benefit.

(5) The books circulated, whether of general nature or on some particular subject, would be of the highest class, selected by persons of experience, in touch with the library commission work of other states and profiting by their experience. This is not the case when books are rented by a commercial circulating library whose object is to rent the greatest number of volumes regardless of quality.

The sum of $1,500 annually would place at least one library in each county the first year, two the second, and three the third year, and would probably maintain four or five libraries in circulation in each county thereafter. I should be pleased to supply further information, and statistics of what the older states are doing in this line of work.

Respectfully submitted,

HOWARD J. HALL, Librarian.

REPORT OF DEPARTMENT OF MATHEMATICS AND MECHANICS.

Department of Mathematics and Mechanics,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report for the department of mathematics and mechanics for the year 1902.

The following table shows the work done in the department:

Subject.	Hours per Week.	No. Students.
Second Semester, January to June.		
Arithmetic and Algebra, I Sub. Coll. class, (Cole)	3	37
Algebra, II Sub-Collegiate class (Cole)	5	32
Plane Geometry, IV Sub-Collegiate class (Woodward)	5	24
Bookkeeping, III Sub-Collegiate class (Hollingshead)	5	22
Higher Algebra, Freshman class (Woodward)	5	18
Analytic Geom., Sophomore class (Smith)	5	7
Mechanics, Senior and Junior classes (Woodward)	5	8
First Semester, September to January.		
Arithmetic, I Sub-Collegiate class (Evans)	3	30
Algebra, II Sub-Collegiate class (Evans)	5	44
Geometry, IV Sub-Collegiate class (Woodward)	5	28
Bookkeeping, II Sub-Coll. class (Hollingshead)	5	26
Trigonometry, Freshman and Soph. classes (Woodward)	5	24
Calculus, Junior class (Woodward)	5	6

The course in Analytic Mechanics includes the Mathematical treatment of statics, dynamics and strength of materials with some elementary graphic statics. In order to cover the subject thoroughly one-half of the course is given during the second semester of one year, and the remainder of the course during the second semester of the succeeding year. Thus it is necessary for a student to attend the class two successive years in order to cover all the work of the course. By this arrangement the junior and senior classes take the work together, and but one-half as much time is required on the part of the instructor as would be needed if the whole course were given every year.

The primary object of the collegiate course of mathematics is to prepare the prospective engineer to successfully solve the problems which he will meet in the practice of his profession, for it may be safely said that modern science and engineering would be utterly impossible without the aid of higher mathematics. In addition to this more utilitarian purpose, the study of mathematics furnishes a means of mental growth and discipline equal to that afforded by any line of study.

The work in higher algebra and trigonometry is chiefly preparatory to the higher branches. It is only with a knowledge of analytic geometry and calculus that the real scope and power of mathematics becomes apparent to the student. In these studies a new field of view is opened, as new as that which comes from the acquisition and use of a foreign language. In the calculus the student possesses an instrument for the solution of complex problems that as much transcends in power elementary algebra and geometry as do these subjects surpass the powers of elementary arithmetic. In fact, calculus is indispensable for an understanding of nearly every engineering subject which we teach, such as hydraulics, structural design, thermodynamics and theory of the steam engine, development, transmission and utilization of power.

For several years we have been extending our teaching of various engineering branches. This has necessitated a corresponding increase in the amount of ground covered in mathematics, requiring more time for the class work. In order to teach all the subjects that are needed by our students, Professor Smith and myself have been teaching one set of subjects during one year and another set of subjects during the next year, so that in two years all the branches were taught. This method has been inconvenient to the students as well as ourselves, and is becoming less feasible every year on account of the growing size of our classes and the increased amount of ground to be covered.

For the next school year, if we are to do the work needed and demanded by our students in civil, mechanical, and mining engineering, we must have additional assistance for the teaching of the engineering and mathematical branches.

Respectfully submitted,
S. M. WOODWARD,
Professor of Mathematics and Mechanics.

REPORT OF DEPARTMENT OF HISTORY, ECONOMICS AND PEDAGOGY.

Department of History, Economics and Pedagogy,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report of the work of the department of History, Economics and Pedagogy for the year 1902.

The following table shows the work done in this department during the year:

Subject.	No. hours per week.	Students enrolled.
History.		
Second Semester, January to June.		
American History, I Sub-collegiate class (Adams-Oglevee)	2	33
General History, III Sub-collegiate (Ferrin)	3	36
English History, Freshman class (Adams)	4	7
Economics and Political Science.		
Civics, IV Sub-collegiate class (Hollingshead)	2	17
Parliamentary Law, III and IV Sub-collegiate class (Adams)	1	49
Philosophy, Pedagogy and Ethics.		
Pedagogy, Junior and Senior classes (Adams)	5	3
Ethics, Junior and Senior classes (Adams)	3	6
First Semester, September to January.		
History.		
American History, I Sub-collegiate class (Butterfield)	2	30
General History, II Sub-collegiate class (Butterfield)	3	28
General History, IV Sub-collegiate class (Hollingshead)	2	25
English History, Freshman class (Butterfield)	4	6
American Politics, Seniors (Adams)	4	3
Economics and Political Science.		
Parliamentary Law, IV Sub-coll. class (Adams)	1	32
Economics, Junior and Senior classes (Adams)	2	8
Economy and Sociology, Junior and Senior classes (Adams)	2	3

Detailed description of all these courses may be found in the annual register. The courses in pedagogy, ethics and economics are given in alternate years only. The course in American politics is offered this year for the first time and consists of a detailed study of the growth and principles of political parties from 1787 to the present time. Besides the work listed above since September, I have had charge of the work of three post-graduate students in philosophy and two in pedagogy. These are candidates for the masters' degree, the first that the University has ever had.

In general the year has shown marked progress in this department. The classes in the sub-collegiate department have been hampered by the lack of sufficient books for reference work, but this is being gradually overcome. The collegiate classes have been larger than ever before and because of better preparation have been able to do more advanced work and more original work.

Respectfully submitted,
F. YALE ADAMS,
2 Professor of History, Economics and Pedagogy.

REPORT OF DEPARTMENT OF MINERALOGY AND CHEMISTRY.

Department of Mineralogy and Chemistry,
University of Arizona,
Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report for the Department of Mineralogy and Chemistry for the year ending December 31, 1902:

Two courses in Mineralogy are offered, one a full years' course, the other, an irregular course, usually extending over one-third year. The work accomplished in the former course consists in the determination on the part of the student of 120 varieties of minerals by the methods of blowpipe analysis, the attendance at about thirty lectures and recitations on Crystallography and forty lectures on the classification and uses of minerals. The shorter course consists entirely of laboratory practice in the determination of nearly fifty of the most common minerals. It is designed for the special students in Mining and Assaying who have not received the training necessary for the complete course.

During the school year ending June, '02, six students completed the regular course and five availed themselves of the opportunity to take the shorter course.

During the present year five are registered for the year's course.

The Department of Mineralogy is greatly in need of a large type collection of minerals, costing about $2,000, for illustrations in class work.

In the Department of Chemistry, four years' work is now offered leading up to a degree of B. S. in Chemistry. The work accomplished by the students during this time, provided they are working for a degree, consists in a large amount of laboratory practice, the following being the most important determinations: The complete analysis of dolomite iron ores, slags, matter, oils, gases, and water; the assaying of gold, silver, lead, copper, zinc, manganese, mercury and nickel ores; and practice in leaching gold ores on a small scale by the cyanide process.

The class-room work consists of about seventy-six lectures in Elementary Chemistry, eighteen in qualitative analysis, thirty-six in quantitative analysis and thirty-six in metallurgical chemistry.

Durng the year ending June, 1902, the following classes were taught:

Qualitative analysis, consisting of	13	students
Quantitative analysis, consisting of	13	"
Metallurgical chemistry and assaying, consisting of	7	"
Total	83	"

During the present year there are the following classes:

Elementary chemistry, consisting of	18	students
Qualitative analysis, consisting of	5	"
Quantitative analysis, consisting of	7	"
Metallurgical chemistry and assaying, consisting of	4	"
Advanced inorganic chemistry (4th year), consisting of	1	"
	35	
Deducted for counted twice	2	
Total in Department of Chemistry	33	"

During the present year the laboratories have been increased in size, thus accommodating fourteen more students than last year. The space, however, is still inadequate, students being greatly hindered in their work for lack of room. The work of keeping the laboratory in order and preparing reagents is performed by two assistants appointed from among the students of the upper classes in chemistry. The work of instruction is accomplished by one Professor and one Instructor, Mr. Mann, who was appointed temporarily from the Commercial Assay Department to assist in instructing from one to two hours per day.

The laboratories are well supplied with chemicals and apparatus, no new apparatus having been added during the past year except the ordinary amount of glassware and $100 worth of platinum crucibles and dishes.

Respectfully submitted,
F. N. GUILD,
Professor of Chemistry and Mineralogy.

REPORT OF DEPARTMENT OF MECHANIC ARTS.

Department of Mechanic Arts,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report of the Mechanic Arts Department for the year 1902.

The classes taught by me and data concerning the same are tabluated below:

Class.	Subject.	Periods per week.	Number of Students. Jan.-June.	Sept.-Jan.
1st Sub-Col.	Sloyd and Freehand Drawing	10	38	38
2nd Sub-Col.	Joining and Draughting	10	17	Begins Feb. 9
4th Sub-Col.	Forging and Draughting	7		4
Freshman	Gen. Shop Work and Descript. Geom.	10		11
Sophomore	Machine Work and Machine Design	10	11	1
Unclassified	Draught'g and Artistic Draw'g	5 to 10	17	6

The courses of instruction are practically the same as in former years.

With the exception of a few small tools and some repairs there have been no additions to the equipment.

Respectfully submitted,
D. H. HOLMES,
Professor of Mechanic Arts and Drawing.

REPORT OF DEPARTMENT OF PHYSICS AND ENGINEERING.

Department of Physics and Engineering,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona.

Sir: I have the honor to submit the following report for the department of Physics and Engineering.

This department was inaugurated two years ago, and is still of very humble proportions. Since one half of my time is occupied by classes in physics and mathematics, there is left enough for only two engineering classes, and but a small portion of the great range of engineering subjects can be attempted. In selecting the subjects to be taught the needs of the mining interests and the railroad development of the territory have been primarily considered.

First in importance and of most general usefulness is Surveying. The course begins with the manipulation and care of all surveying instruments, then takes up land surveying, computations of areas, laying out of public lands, determination of latitude and azimuth, topographical, railroad, and mine surveying. The field work is carried on from eight to twelve o'clock on Saturdays, and accurate, practical surveys of all kinds are performed. This course is scheduled for sophomores, and the class this year numbers twenty students.

Instead of giving the same course in engineering year by year to the senior class, two courses are offered, and are given on alternate years. They are open to seniors and juniors ,and therefore each student is able to obtain both. The courses are as follows:

First—A course in Mine Engineering, embracing exploratory workings and boring, machine rock drills, study of explosives, laying out of workings, timbering, methods of winning the ore, hoisting and hoisting engines, underground transportation, mine ventilation. This occupies the first semester, and is followed by metallurgy of iron and steel, copper, and lead during the second semester. The course was given last year to a class of nine students.

Second—A course in Engineering Construction and Hydraulics. Under the former title is included the properties of materials of construction, such as cement, steel and timber, and the scientific design of engineering structures, such as bridges and dams with regard to stability and proper economy. In hydraulics the principles which underlie the storage, distribution, and measurement of water and the utilization of water power are studied. This course is scheduled for two-thirds of the year, and the remaining third was intended to be devoted to ore dressing, but that will be impossible until the mill is put in shape for use. This course is being given the present year to a class of five.

Both of the above courses are accompanied by much designing and drawing of structures such as hoisting frames, furnaces, and arches; and in connection with the former course an excursion is made to some important mining section for a week's practical study and observation. The trip this year was to Clifton and Morenci, where every facility for study was offered us by the mining companies of that section.

In addition to the above, Professor Woodward gives on every second year a course in Mechanical Engineering to the junior and senior classes together. This course covers a brief treatment of a number of subjects relating to the use of machinery, including kinomatics of machinery, elementary thermodynamics, theory of the steam engine, selection, care and testing of steam engines, heat and combustion of fuel, types and management of boilers, development of power from natural sources, transmission of power. The course is being given this year to a class of nine students.

The great need of this department is apparatus. No school can properly train young men for technical pursuits by other than laboratory methods of instruction. At present our preparatory students are much occupied in the manual training work, the lower college classes have well equipped chemical and physical laboratories and an excellent collection of surveying instruments, but we have nothing to offer our students during the last year or two of their course except text-books and lecture work, unless they are behind in their chemical studies. Near the end of their course, when by their greater maturity they could make the most judicious and effective use of apparatus and just before they go out perhaps to take positions of much responsibility they are practically neglected so far as laboratories are concerned.

I strongly recommend that the engineering courses be properly supported in the following ways:

First—By the construction of a laboratory for ore dressing with stamps, tables and accessory machines of such size and flexible construction as to be available for experimental work. A great many low grade ore propositions are being exploited in Arizona at the present time, and the benefit that will accrue to the territory from such laboratory will be a handsome return for the investment.

Second—By the construction of a hydraulic laboratory. Perhaps in no other place is hydraulics taught without a certain amount of equipment. It is a vital subject to engineers, but cannot be learned from text-books alone.

Third—By the purchase of a machine of a hundred thousand pounds capacity for testing materials of construction.

The above additions are absolutely essential to the proper teacihng of the engineering courses already offered. Later it is expected to extend the scope of the work by offering special courses in railroad engineering, bridge engineering and sanitary engineering.

PHYSICS.

A course in general physics is given to the fourth preparatory students. Mechanics of solids, liquids and gases; heat, sound, light, electricity and magnetism are taken up in order, and each student performs about seventy experiments. The class this year numbers sixteen.

A demand has long existed for a college course in physics, and it is hoped that a way may be provided for teaching it next year.

Respectfully submitted,
GEO. E. P. SMITH,
Professor of Physics and Engineering.

REPORT OF THE DEPARTMENT OF BIOLOGY.

Department of Biology,
University of Arizona.

Tucson, Arizona, December 20, 1902.

F. Yale Adams,
President University of Arizona.

Sir: I have the honor to submit the following report of the work of the department of Biology for the year 1902.

SUB-COLLEGIATE WORK.

During the semester ending February, 1902, I instructed a class of fifteen students of the fourth sub-collegiate year in elementary physiology. Blaisdell's Practical Physiology was completed in addition to dissection work and microscopic studies of the important tissues. Especial attention was given to sanitation and the very practical problem of dealing with bacteria. In connection with this work, I shall take the liberty to suggest the need of a good set of physiological models to supplement those already on hand.

UNIVERSITY WORK.

From February to June, 1902, I instructed a class of three in botany 1: between September and the present date, I have instructed a class of nine in botany 1 and a class of three in botany 3. Botany 1 deals with histology of the cell, cell-aggregates or tissues and the tissue-systems, also with the general principles of plant physiology. Botany 2 completes the year's work with a study of representative types of the more important groups of the plant kingdom. The work done is almost entirely microscopic, ten laboratory periods being given each week. Bessey's "Essentials of Botany" is used as a guide and from time to time supplemented with lectures. Botany 3, 4 treats of the taxonomy and ecology of specialized groups of our native flora. Various works on the botany of the Southwest are employed here and ten laboratory periods are required each week.

SCIENTIFIC.

The crowded condition, together with the unfavorable location of the rooms of the biological department in times past is too well known to need any comment here. At the beginning of the present school year, this department was moved into the south half of the museum room, with the arrangement that the remaining half of the room is to be given over to the department of Biology as soon as vacated by the museum. When this condition obtains, ample space will be afforded the valuable collections in addition to well-lighted and convenient laboratory and recitation rooms.

The work of the flora of Arizona is being carried on as rapidly as is consistent with the small amount of time allotted. The Botanical Survey of Arizona, together with the study of the ecology and biology of the species are special features of this important work. The herbarium of the Botanical Survey of Arizona contains about 2500 sheets, the same plant being represented from as many widely-separated localities as possible. The department is being aided by several botanists of note in the prosecution of this work.

During the year over 2000 sheets have been added to the plant collections. Of this number, 500 are grasses collected by Dr. Griffiths and the writer, 500 are miscellaneous specimens collected from southern Arizona, 800 are fungi, including a set of West American Fungi purchased by the University and others contributed bv the writer, and 300 are plants of northern Arizona donated by the New York Botanical Gardens: The latter collection was made by Dr. MacDougal and is of special value to the University since it contains type specimens of about twenty species new to science. Acknowledgements are also due Mrs. M. B. Aguirre, Tucson, Arizona, for a collection of Arizonan and Mexican plants. At this time, about a thousand specimens are on hand to be determined and placed in the herbarium, and several times that number for exchange. In connection with this work, it should be stated that Miss Mead, a student in botany, was appointed assistant in herbarium work at the beginning of the year.

A collection of seeds of economic plants, aggregating 1200 varieties, the property of the Experiment Station, has been added to the botanical collections.

Respectfully submitted,
J. J. Thornber,
Professor of Biology.

REPORT OF THE DEPARTMENT OF MODERN LANGUAGES.

Department of Modern Languages,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams,
President University of Arizona.

Sir: The undersigned hereby respectfully submits the following report of the Department of Modern Languages:

1. This report begins with the opening of the University on the 15th of September, 1902—the date of the undersigned's connection with this institution.

2. The classes under the immediate supervision and instruction of the undersigned are seven in number, to-wit:

1 class in advanced French	3	students	
1 class in elementary French	6	"	
1 class in elementary German	6	"	
2 classes in advanced Spanish	16	"	
2 classes in elementary Spanish	36	"	—larger—30 students

It will be observed from the large number in classes that the department is greatly in need of at least one instructor in order that the growing demand for instruction in modern languages may be adequately met.

The work in advanced Spanish is unavoidably curtailed and the large class in elementary Spanish is necessarily divided and distributed in such manner that not more than half the time required for effective work can possibly be given to four of the classes. Assistance is required, and we need it now.

3. The elementary, or beginners' classes have been engaged in the systematic study of grammatical forms and the structure of language in general, in the preparation for higher work in the literature of those languages, as well as for the more practical application of them in conversation. As far as practicable the foreign tongue is used in class bv the instructor, and pupils are encouraged to do the same. The process is a slow one, but sure of ultimate good.

4. The advanced classes, besides the continued study of advanced grammar, are, or have been, engaged in reading selections—for the present, rather the simpler short stories or descriptive literature with the view of placing them upon such solid foundation in language that they may be able to help themselves and continue the intelligent study of language, both from the view point of instruction and entertainment. Later the advanced classes, as their progress warrants, will be given a taste of the best authors. It is not well, however, to be hasty in this matter as familiarity with the foreign tongue itself is the first requisite to a correct appreciation and enjoyment of the literature of the same.

5. A course in German has been added to the Modern Language Department during the present year. It is well to encourage the study of German, as therein is to be found the highest expression of modern educational thought, and its knowledge is of inestimable value in all scientific work, as well as from a literary standpoint. It is at present imperative that every institution of learning should offer a full course in the German language and literature. It is not intended, by this eulogy of the German, to belittle the advantages found in the study of French or Spanish, since each for itself has its proper sphere in the literary, scientific and commercial world. Spanish is particularly important in that its immediate value in the Southwest is justly recognized. The study of foreign languages has not only a refining, but a broadening influence, and should not be undertaken without considering the enduring quality which belongs to them, namely: that of intimate contact with new thought at first hand, and an acquaintance with the master minds of the world.

Respectfully submitted,
J. M. Patton, A. M.
Assistant Professor of Modern Languages.

The following table shows the work done in this department from January to June by Louise H. Foucar, Professor of Modern Languages:

Subject.	Hrs. per week.	Students.
1st year Spanish, 1st division	5	14
1st year Spanish, 2nd division	5	5
2nd year Spanish	4	6
1st year French	5	6
2nd year French	4	4

REPORT OF THE MILITARY DEPARTMENT.

Headquarters, Battalion of Cadets,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report of the work of the Military Department for the year 1902.

1. From January to June, 1902, the late Captain G. W. Cole, U. S. A., retired, was in charge as military instructor and commandant. During a portion of that period two companies formed the battalion of cadets, but toward

the latter part of the year the numbers, having been reduced by the departure of students seeking employment as a means of livelihood, or through other cause, occasioned the reduction of said battalion to one company.

2. There were received during the first quarter of 1902 one hundred stands of Springfield Cadet Rifles, calibre 45, model 1884, accompanied by the requisite accoutrements; also one three-inch rifled gun, model 1861, suitably mounted and equipped, all of which are at the present time in good condition.

3. The gold medal offered by the faculty each year was competed for, and won by Corporal Fritz Bernard. Same to be held by him for one year, i. e., until June, 1903, when it will again be the subject of competition. This medal when won on three occasions by the same individual becomes the property of the winner. A second medal given by the cadets was so closely contested that lots had to be drawn to reach a decision. It was won by Private A. Page.

4. The undersigned assumed the duties of Commandant and Military Instructor on September 15, 1902. Two companies were formed. Company A, containing three commissioned officers, seven non-commissioned officers and thirty-three privates. Company B, the same number:—promotions having been made to fill the vacancies occasioned by the resignation or absence of certain officers. The officers thus temporarily appointed were by General Order No. 9 commissioned by the Governor of the Territory, and said commissions were in due time delivered to them.

5. The full allowance of ammunition for small arms and the three-inch rifle, was duly received during the month of October last.

6. Under the efficient charge of Captains Edward S. Stafford and Courtland F. Day and their subordinates, the two companies have reached a degree of efficiency, that is highly creditable to the ability of their officers and the obedience of their men. The undersigned has also been governor of the dormitory since September last, and it gives him pleasure to testify to the manly and gentlemanly qualities of the officers and men of the battalion, as well as to the uniform courtesy and exemplary conduct of all of the young gentlemen who occupy quarters in the dormitory. It is a pleasure to be associated with them. At the present time there are sixty-five students, and three instructors, besides the undersigned, occupying rooms in the dormitory.

7. A brass band has been organized, composed of sixteen musicians and drummers. They are making excellent progress, and have furnished music on several occasions of military ceremony, as well as at drill. They are under the leadership of Mr. Frank C. Kelton, who is entitled to great credit for the happy result.

Respectfully submitted,
J. M. PATTON, (Major N. G. A.),
Acting Professor Military Science and Tactics.

REPORT OF DEPARTMENT OF DOMESTIC SCIENCE.

Department of Domestic Science,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report for the Department of Domestic Science for the year 1902:

From January 1, 1902, to June 6th, a class of sixteen I sub-collegiate were taught eight periods per week—six cooking and two sewing.

From September 17, 1902, to January 1, 1903, a class of seven I sub-collegiate were taught, ten periods per week—four cooking, four sewing and two general. Also a class of four II and IV sub-collegiate in dressmaking taught ten periods per week.

The course in Domestic Science is arranged to give instruction in the science and art of home economics. It includes all branches of home, science, hygiene, chemistry of cooking and cleaning, preparation of the various food products, both fancy and elementary. The sewing taught gives a complete knowledge of plain and fancy sewing and dressmaking. Another course in dressmaking has been added.

There is a special need of charts showing the compositions of the various food products, the cuts of meat, and also charts in the sewing class for drafting and cutting.

Respectfully submitted,

(Signed) MABEL GREY HOOVER,
Instructor in Charge of Domestic Science.

REPORT OF DEPARTMENT OF ORATORY.

Department of Oratory,
University of Arizona,

Tucson, Arizona, December 20, 1902.

F. Yale Adams, President University of Arizona:

Sir: I have the honor to submit the following report for the Department of Oratory during the year 1902.

My work in this institution began on September the twenty-second, nineteen hundred and two. I found the students with their full course selected with the expectation that no oratory course would be offered. On organizing classes I enrolled two, viz, A and B, composed of five and six students respectively. These are in the Collegiate Department. Each class recites one hour twice per week. They have requested that they be given an additional hour per week in order to study Shakespeare Reading.

The work in these classes comprises a study of the vocal organs, the essentials of a good speaking voice, and the sources and elements of oratorical power. Imaginary mass meetings are held in which the students are taught the art of extempore speech and how to attack or defend a statement. In this work extraordinary interest is shown and marked development is manifested.

The classes in the sub-collegiate department are Class A, of sixteen members, and Class B, of twelve. They are studying the elementary principles of vocal expression, including the argument and the declamation. A reading is required of each member every three months, and he is graded upon his improvement from time to time.

In addition to these classes and by no means of less importance are the Literary Societies recently organized. The enthusiasm with which they began their work has not abated, but has increased. On the evening of October the third, the Societies of the Philomathean and University Club sprang into existence. In a few days open meetings were being held and the public shared equally with the students and faculty in appreciation of lively discussions. Joint debates are held by these Societies once each semester, and it is hoped that a prize may be offered for the best orator at least once a year. An oratorical association has been organized aggregating more than fifty active members.

The Society of the Chrestomathean has been organized by the preparatory students. They hold a meeting once each week, and have a membership of twenty-eight.

In this competitive age the earnest and ambitious student will do well to control his thought and render it invincible in discussion. The study of Oratory will be demanded of our foremost men while popular government lasts; it will have ceased to be essential only when the human voice is dumb. The sentiment in favor of this high art in the University of Arizona has had a phenomenal growth, and bids fair to be of long-continued life.

Respectfully submitted,

J. W. GORBY,
Instructor in Charge of Department of Oratory.

DEPARTMENT OF LATIN AND SCIENCE, SUB-COLLEGIATE DEPARTMENT.

The following table gives the work in the sub-collegiate department, not included in the foregoing reports:

Subjects and Instructor.	No. Hours per week.	Students in class.
Semester, January to June.		
Beginning Latin, II Sub-collegiate Class (Ferrin)......	5	12
Advanced Latin, III Sub-collegiate Class (Ferrin).....	5	7
Physical Culture, all classes (McGaughey)............	4	39
Stenography, IV Sub-collegiate Class (Towner)........	5	12
Chemistry, III Sub-collegiate Class (Forbes)..........	4	12
Physical Geography, I Sub-collegiate (Cole)...........	5	33
First semester, September to January.		
Beginning Latin, II Sub-collegiate Class (Stanley).....	5	7
Second year Latin, IV Sub-collegiate Class (Ferrin)....	5	14
Third year Latin, Freshman Class (Stanley)...........	5	4
Physical Culture, all classes (Butterfield...............	4	33
Stenography, IV Sub-collegiate Class (Towner).......	5	10
Physical Geography, I Sub-collegiate Class (Stacey)....	5	29

ANNUAL REPORT OF THE PRESIDENT OF THE UNIVERSITY OF ARIZONA.

University of Arizona, Jan. 1, 1902.

Hon. William Herring,
Chancellor, Board of Regents,
University of Arizona.

Dear Sir: I have the honor to submit the Annual Report of the President of the University of Arizona for the year 1901.

The departments and courses of the University are arranged as follows:

I. College of Agriculture and Mechanic Arts.
  A literary course leading to the degree of B. Ph.
  A scientific course leading to the degree of B. S.
  An engineering course leading to the degree of B. S.
  An agricultural course leading to the degree of B. S.

II. School of Mines.
  A mining engineering course leading to the degree of B. S. in mining.
  A two years' course in Assaying.
  A Bureau of Mines and Assaying.

III. Agricultural Experiment Station.

IV. Sub-Collegiate Department.
  English, Classical and Scientific courses.
  Manual Training and Domestic Science courses.
  Commercial courses.

The details of these various courses are set forth in the Annual Register of the University.

FACULTY.

The following changes in the faculty have occurred since the last report:

M. M. Parker, A. M., was succeeded on September 5, 1901, by Frank Yale Adams, A. M., as Acting President.

The following resigned at or near July 1st.

David Griffiths, Ph. D., Professor of Biology and Botanist, Agricultural Experiment Station.

Mary E. Plimpton, A. M., Preceptress and Associate Professor of English.

Mrs. Emma Monk Guild, Instructor in Sub-Collegiate Department.

Mrs. Mary Bernard Aguirre, Instructor in Spanish and History.

Dr. Griffiths was succeeded by John James Thornber, A. M., and Mrs. Guild by Hattie Ferrin, B. S. Miss Mildred Chase became preceptress without teaching work.

The following changes in assignment of work have been made:

Upon my assuming the duties of Acting President, the duties of Commandant and Governor of the Barracks were provided for by obtaining from the War Department of the United States the detail of Captain George W. Cole, C. E., (retired). Captain Cole is also instructor in mathematics and physical geography in the Sub-collegiate department. Upon the resignation of Mrs. Aguirre, Miss Louise H. Foucar became Professor of Ancient and Modern Languages.

The following list gives the Faculty as at present constituted:

Frank Yale Adams, A. M., Acting President, Professor of Economics, History and Pedagogy.

William Phipps Blake, A. M., Director of School of Mines, Professor of Geology.

Howard Judson Hall, A. M., Professor of English, Librarian.

Robert Humphrey Forbes, M. S., Director and Chemist, Agricultural Experiment Station.

Sherman Melville Woodward, M. S., Professor of Mathematics and Mechanics, Meteorologist, Agricultural Experiment Station.

enj. Franklin Stacey, A. B., Instructor in Science

Alfred James McClatchie, A. M., Professor of Agriculture and Horticulture, Agricultural Experiment Station.

David Hull Holmes, B. S., Professor of Drawing and the Industrial Arts.

Gordon H. True, B. S., Professor of Animal Husbandry, Agricultural Experiment Station.

George Edison Philip Smith, C. E., Professor of Physics and Engineering.

William W. Skinner, M. S., Assistant Chemist, Agricultural Experiment Station.

John James Thornber, A. M., Professor of Biology, Botanist, Agricultural Experiment Station.

Louise H. Foucar, A. B., Professor of Ancient and Modern Languages.

George W. Cole, C. E., (Captain U. S. A., retired), Commandant of Cadets, Instructor in Mathematics.

Opal Le Baron McGaughey, B. E., Instructor in Physical Culture and Elocution.

Mabel Grey Hoover, Instructor in Domestic Science.

Hattie Ferrin, B. S., Instructor in English and Latin.

Nora Turner, President's Secretary, Instructor in Stenography and Typewriting.

Elbert J. Hollingshead, Instructor in Bookkeeping.

Mildred M. Chase, A. B., Preceptress.

The growth in students and faculty and the number of graduates are shown in the following table:

Years.	Professors.	Instructors.	Students.	Percent of College Students.	Graduates.
1891—1892	6	2	31	29	
1892—1893	8	4	38	50	
1893—1894	7	2	57	50	
1894—1895	9	1	47	50	3
1895—1896	10	4	100	35	
1896—1897	9	5	151	23	3
1897—1898	11	4	156	25	4
1898—1899	10	7	133	23	1
1899—1900	12	10	161	26	4
1900—1901	12	7	225	21	4
1901—1902	12	7	215	33	9

The residence of students is shown by the following table:

Years.	Arizona Tucson.	Arizona Outside Tucson.	Other States.	Total.
1891—1892	27	3	1	31
1892—1893	33	2	3	38
1893—1894	50	3	4	57
1894—1895	35	8	4	47
1895—1896	55	39	6	100
1896—1897	70	68	13	151
1897—1898	78	67	11	156
1898—1899	67	46	20	133
1899—1900	83	46	32	161
1900—1901	107	94	24	225

At the present date 193 students have been registered. This enrollment, while not complete, is the largest in the history of the institution at this time in spite of the fact that at the beginning of the present school year the grade of the Sub-collegiate Department was raised one year. To me the most gratifying feature is the increase in college students.

BUILDINGS AND GROUNDS.

The University Grounds comprise forty acres. Mr. S. P. Greenleaf has recently been engaged as Superintendent of the grounds, and under his direction the appearance of the grounds has been greatly improved. It is the intention to improve the lawns and hedges and make the University Campus a model for this section of the country. A new and more ornamental fence about the grounds is greatly needed.

No new buildings have been erected during the past year, but the present buildings have been repainted during the summer, the floors in the dormitories painted for the first time, and many improvements long needed were introduced. Minor changes were made in the University Hall, giving more rooms and increased facilities. The last legislature of the Territory appropriated $25,000 for the purpose of erecting a library and museum building, but this is not yet available, as it has not been approved bv Congress.

DORMITORY AND MESS.

The general conditions of the dormitories have been good, although South Hall, the boys' dormitory, is too small to meet the demand for rooms. This is in charge of Captain G. W. Cole, who lives in the building. With the subcollegiate students, strict military discipline is maintained, the college students being given greater liberties. Miss Mildred M. Chase is in charge of North Hall, the ladies' dormitory.

The satisfactory conduct of the Mess Hall has been a hard problem, but I believe it has at last been solved by the employment of Prof. W. W. Skinner as caterer. He has full charge of buying all supplies and employing help, and in the short time he has had charge the service has been most satisfactory.

OFFICE AND ADMINISTRATION.

Since assuming the duties of Acting President my energies have been chiefly devoted to establishing order and system in the executive work of the University. Following the recommendation approved by you, a complete system of bookkeeping had been introduced, and four new sets of books opened. The card system of records is kept of everything pertaining to the internal management of the University and of requests for catalogues, information, etc. We are badly in need of filing devices and proper furniture. By cutting a door through the partition between the former office and my recitation room a private office has been formed. This should be furnished with regular office chairs, etc.

RECOMMENDATIONS.

I would respectfully suggest for your consideration the following recommendations:

The present system of lighting the buildings is both unsatisfactory and unsafe. The use of coal oil is a constant menace to the safety of the buildings and their valuable contents. A complete electric lighting plant should be installed at the earliest possible moment.

In buildings the most pressing need is for a new Dining Hall. The present hall was designed to seat 65 as a maximum number. For at least two years we have been compelled to seat from 85 to 100 therein. The kitchen is likewise inadequate. A building separate from either of the dormitories should be constructed for a kitchen and dining hall.

The present mill building has become absolutely useless for any purpose which can benefit the University, while its situation attached to the University Hall is a menace in case of fire, and greatly increases the cost of insurance. The machinery is much of it antiquated and hence valueless for purposes of instruction. The mill should be torn down and a new and modern mill be erected at some place apart from the other buildings. I am confident that if such a mill were erected manufacturers would furnish the necessary machinery at comparatively little cost to the University. The growing importance of our mining course makes a modern and well equipped mill a practical necessity, if we are to hold our own with other schools.

A small addition to the Assay building is also desirable for the purpose of giving room for the installation of machinery for grinding and preparing samples. At present this work is done by hand in the old mill building. By building such an addition as suggested at slight cost, this work could all be done by the assayer.

I would also recommend at the end of the school year a general arrangement of work and salaries. A principal should be placed in charge of the Sub-collegiate department with duties similar to those of a High School Principal, thereby relieving the President of the drudgery of the detial work.

REPORTS OF HEADS OF DEPARTMENTS.

I would call your attention to the reports of the various heads of Departments of the University which are annexed and hereby made a part of this report.

I would call especial attention to the recommendations of the Professor of Chemistry and Mineralogy and of the Librarian. The Agricultural Experiment Station having made a separate report to the Governor at a late date, as required by law, no report of their work is included. Annexed to the report is a detailed statement showing the number of hours per week taught, the number of students in classes of each person connected with the University as instructor during the year.

FUNDS.

Annexed will be found the report of receipts and disbursements of the various funds of the University, and a tabular statement of the work of the different professors and instructors.

THE WORK OF INSTRUCTORS, 1901.

Instructors.	Subjects.	Hours per Wk. Jan. to June.	Hours per Wk. Sept. to Jan.	No. of Students. Jan. to June.	No. of Students. Sept. to Jan.
F. Yale Adams,	History	12	6	45	45
F. Yale Adams,	Economics and Pol. Science	10	1	90	54
F. Yale Adams,	Psyc. and Pedagogy	..	5	..	6
F. Yale Adams,	U. S. History	..	2	..	38
M. B. Aguirre,	History	5	20	..	..
Hattie Ferrin,	History	..	5	..	..
S. M. Woodward,	Logic	..	4	4	..
W. P. Blake,	Geology and Astronomy	5	5	6	10
(½ assistant's time)					
H. J. Hall,	English	13	13	29	..
M. E. Plimpton,	English	10	41	..	..
Mrs. E. M. Guild,	English	10	66	..	..
Hattie Ferrin,	English	..	10	..	..
O. L. McGaughey,	English	8	7	80	78
S. M. Woodward,	Mathematics	10	15	5	55
S. M. Woodward,	Sci. App. Math.	10	4	36	1
G. E. P. Smith,	Mathematics	5	5	6	8
Mrs. E. M. Guild,	Mathematics	0	..	61	..
E. J. Hollingshead,	Bookkeeping	8	8	32	20
L. H. Foucar,	Mathematics	5	..	13	..
F. N. Guild,	Chemistry	15	15	27	33
F. N. Guild,	Assaying	5	..	9	..
R. H. Forbes,	Chemistry	4	..	11	..
(2 assistants)					
D. H. Holmes,	Shop and Draw.	20	20	40	59
(1 assistant)					
Dr. David Griffiths,	Botany	5	..	3	..
J. J. Thornber,	Physiology	..	4	..	13
Geo. W. Cole,	Physical Geography	..	5	..	44
G. E. P. Smith,	Physics	5	5	7	18
G. E. P. Smith,	Surveying	5	..	16	..
G. E. P. Smith,	Engineering	..	5	..	9
G. E. P. Smith,	Engineering	5	..	2	..
L. H. Foucar,	French	9	9	..	18
L. H. Foucar,	Latin	15	..	25	..
L. H. Foucar,	Spanish	..	14	..	67
M. E. Plimpton,	French	9	..	10	..
Mrs. M. B. Aguirre,	Spanish	15	..	59	..
Hattie Ferrin,	Latin	..	9	..	26
Mabel G. Hoover,	Domestic Science	8	8	26	16
Nora Towner,	Stenography	15	10	17	16
F. Yale Adams,	Military D. & T.	4	..	115	..
Geo. W. Cole,	Military D. & T.	..	4	..	88

STATEMENT OF MORRILL FUND.

Ending June 30, 1901.

Balance on hand July 1st, 1900	$ 9,291.93
Receipts from the Government	25,000.00
Total	$34,291.93
Disbursements for the year	32,506.17
Balance	1,785.86

Expenditures from June 30, 1900, to June 30, 1901.

Agricultural and Mechanic Arts—

Salaries of Instructors	$ 4,370.50
Text books and reference books	110.81
Apparatus, Machinery, etc	7,263.85
Total	11,745.16

English Language—

Salaries of Instructors	5,053.50
Text books and reference books	386.92
Total	5,440.43

Mathematical Science—

Salaries of Instructors	4,937.50
Text books and reference books	11.33
Material	4.20
Total	4,953..03

Natural and Physical Science—

Salaries of Instructors	5,575.26
Text books and reference books	334.80
Apparatus and Machinery	1,746.33
Total	7,656.39

Economic Science—

Salaries of Instructors	2,501.29
Text books and reference books	75.87
Apparatus and Machinery	134.00
Total	2,711.16

Summary—

Agricultural and Mechanic Arts	$11,745.16
English Language	5,440.43
Mathematical Science	4,953.02
Natural and Physical Science	7,656.39
Economic Science	2,711.16
Total	$32,506.17

STATEMENT OF THE TERRITORIAL FUND.

Receipts	$13,068.87
Disbursements for the year—	
Salaries	3,082.88
Labor	3,195.27
Per Diems and Mileage	583.80
Printing and Stationery	647.40
Material and Supplies	319.03
Fuel	548.09
Freight and Express	55.06
Furniture and Fixtures	742.89
Building and Repairs	3,069.38
Apparatus	45.99
Library	81.90
Contingent	737.18
	13,068.87

ASSAY FUND.

Balance on hand January 1, 1901	285.87
Receipts	1,876.50
	2,162.37
Disbursements	1,744.95
Balance	417.42

CONTINGENT FUND.

Receipts	1,164.79
Disbursements	786.30
Balance	378.49

MESS FUND.

Receipts	12,503.56
Disbursements	10,407.35
Balance	2,096.21

The general condition of the University is most satisfactory. There has been continued progress in every department, and the year closes with an excellent feeling among students and faculty. I can not commend too highly the *esprit de corps* of the student body. They are loyal and enthusiastic. The same is true in a larger sense of the faculty. With few exceptions they are tireless and devoted in their work. Nearly every member performing much work outside of his own department. In the short time I have been acting as President, I have been materially assisted by them. I wish to thank the Board of Regents for their constant aid and support given often at the cost of much personal sacrifice on their part.

All of which is respectfully submitted. F. YALE ADAMS,
Acting President.

Department of Geology,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit my report as Professor of Geology for the year 1901.

The instruction is given chiefly by lectures illustrated by the suites of rocks and fossils in the museum; by maps, photographs, models and by drawings on the blackboard. This instruction in the class room is supplemented as far as practicable by field work.

The subject has been divided in treatment as follows:

I. Astronomical introduction.
II. Dynamical Geology.
III. Historical Geology.
IV. Economic Geology, including mineral deposits and veins.

Lectures are also given upon mining and mining machinery, and the mechanical treatment of ores.

Several excursions have been made to interesting exposures of rock formations, and to the mines of the Copper Queen Company by several of the students.

The instruction has been given to the seniors, and to the special students in the mining course. There have also been others who desired the privilege of attending without being regarded as regular students.

At the request of some members of the faculty, several lectures of a popular elementary nature were given to the class in elementary science.

Respectfully submitted,
(Signed) W. P. BLAKE,
Professor of Geology.

Arizona School of Mines,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit a Report of the operations of the Arizona School of Mines for the year 1901.

The work can be conveniently considered under the following heads or divisions:

I. Instruction,
II. Investigation,
III. Correspondence,
IV. Commercial Assaying.
V. Museum,
VI. Publication.

INSTRUCTION.

The regular and special students have enjoyed the privilege of attending the lectures on General Chemistry by Professor Forbes, and on applied Chemistry and Mineralogy by Prof. F. N. Guild. They were also taught in the Analytical Laboratory the methods and processes of analysis of ores and minerals as also the theory and practice of assaying, and of metallurgical practice, including the application of the cyanide process to the extraction of gold and silver.

Instruction has been given by the Director in Geology and Economic Geology by a series of daily lectures, followed by a course of lectures upon ore deposits and mineral veins; upon the occurrence and ways of working the various ores and metals and the machinery used in mining and mechanical preparation of ores.

Prof. Smith has also given instruction in Mining Engineering; upon the Steam Engine and Hydraulics.

I respectfully request your attention to the importance of having instruction upon mining laws and decisions affecting the mining industry. There should be at least a short course of lectures upon the subject.

II. INVESTIGATION.

The remarkable diatomite earth deposits in the middle valley of the San Pedro have been examined and described in a paper by the Director and forwarded to the American Institute of Mining Engineers for publication.

A paper also upon the ancient lacustine deposits of the San Pedro has been prepared for the mid-winter meeting of the Geological Society of America—the Cordilleran Section—to meet at Berkeley, California.

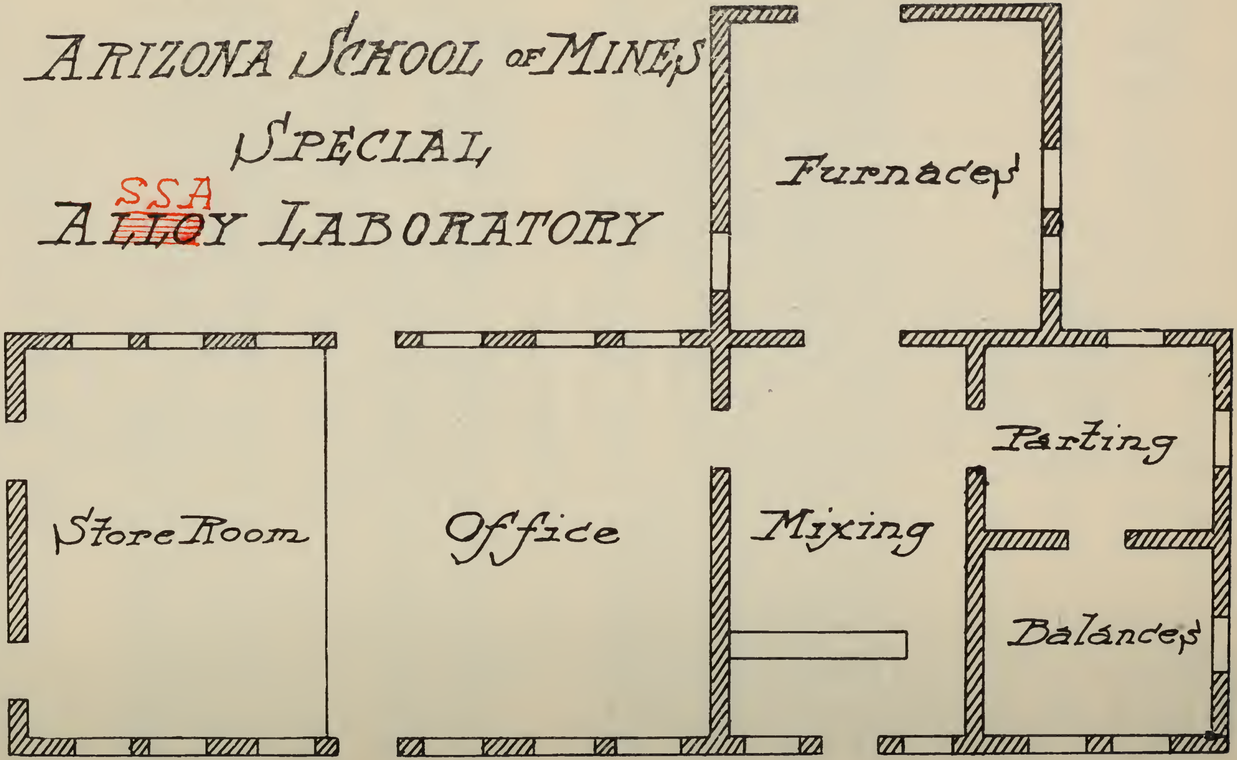
At the request of the engineers and promoters of the projected railway from Tucson to Nogales up the Santa Cruz valley a pamphlet was prepared and published by subscription entitled "Sketch of the Mineral Wealth of the Region Adjacent to the Santa Cruz Valley," 8vo. pp. 22.

Numerous samples are sent to the school from correspondents all over Arizona with requests for information as to their nature. Inquiries are also made of the Director regarding the course of instruction and other details regarding the University and the School of Mines. Many of these samples require careful chemical investigation to determine their exact nature. Amongst other interesting samples those containing venadic and molybdic acid have been the most important. These rare elements occur at several distinct localities in Arizona, and may become industrially valuable.

CORRESPONDENCE.

As indicated by the statement under the heading "Investigation," the correspondence of the Director is voluminous and varied, and it is believed is not without useful results to educational work and to the University in its relations to the community. The School of Mines is very properly regarded as a source

ARIZONA SCHOOL OF MINES
SPECIAL
A~~LLO~~SSAY LABORATORY



of information upon the mineral wealth of the Territory, and letters reach it from all parts of the United States, eagerly desiring any authoritative printed information upon the mining interests. Your director in addition to, and outside of, his regular duties to the School of Mines, and to the University, has annually contributed a report upon the progress of mining and upon the mineral wealth of Arizona, to the Governor of the Territory, and these reports have been embodied in his annual reports to the Secretary of the Interior, and have been printed by the United States Government in Washington.

IV. COMMERCIAL ASSAYING.

The work of assaying for the public has been entirely separate from the instruction in assaying, and has been conducted in the separate building erected for the purpose.

Mr. J. S. Mann was appointed the assayer in place of Mark Walker, resigned. The following tabular statement gives in a compact form the number and nature of the assays made and the amount received and turned over monthly to the Assay Fund, out of which the expenses for apparatus and material and the salary of the Assayer are paid, this department thus being self-sustaining, while tributary in no small degree to the educational work of the University.

SUMMARY OF ASSAYS FOR THE YEAR ENDING DEC. 15, 1901.

Month.	Fire Assays.	Wet Assays.	Chemical Analysis.	Qualitative.	Museum.	Receipts.
1900.						
Dec. 15—Dec. 30	42	27	..	12	..	$ 179.00
January, 1901	71	53	2	26	1	122.00
February	52	43	2	20	1	101.00
March	130	75	1	32	..	200.00
April	116	185	3	63	8	287.50
May	88	212	4	31	5	315.50
June	87	38	..	18	2	141.50
July	62	42	..	27	..	101.50
August	41	21	..	17	..	68.00
September	85	31	1	22	4	120.50
October	60	28	2	21	3	92.50
November	93	40	1	31	14	146.50
December 1 to 15	57	28	..	57	9	......
Totals	984	833	16	377	47	$1876.50

The mill unfortunately is not in a condition to be used owing to the decay and settling of the framework supporting the shafting. This mill should be rebuilt in a site away from the class rooms and in a more thorough and satisfactory form and plan. It is much needed for instruction in practical milling and ore dressing, and there should be money enough secured to employ a regular Mill-man and Machinist to care for it and to run it when required. If electricity can be had from the power house in the city, dynamos can be attached to each piece of machinery so as to run it at pleasure without getting up steam.

MUSEUM.

There have been many accessions to the Museum, particularly of collections of ethnological and archaelogical interest from the region of Yuma sent in by Honorable Herbert Brown. For want of proper room in the museum these valuable acquisitions have necessarily been crowded into two or three cases and placed in boxes where they await the enlargement of the museum and its proper equipment.

The Director has availed himself of all opportunities of collecting specimens of ores and minerals when visiting mines in the mountains and has added a great number of specimens to the collection, valuable to the University not alone as representing the mineral wealth of Arizona but as illustrative material essential to the proper instruction in Geology. Considerable attention is given by the Director to the proper classification and labeling of specimens. A card catalogue cabinet is much needed and would promote the value and usefulness of the Museum.

I can not refrain from again urging upon the Board the pressing need of a fire proof, commodious building for this valuable and growing Museum, which, as I have stated in a communication to the President last January, has become an important factor in the educational work of Arizona. We need a building specially for the Museum and I hope that one of our liberal minded, generous miners of Arizona may be glad of the opportunity to present one to the School of Mines.

PUBLICATION.

It is a matter of regret that the School of Mines is not only without endowment but it has not even a Fund which can be used to print and publish a series of publications by which its usefulness would be greatly extended and promoted. Original papers by the Director and others must go outside of the Institution to secure publication. Fortunately the subject matter is generally of such value as to be received and printed by the learned societies and technical journals without cost to the University, but it would be much more advantageous to be able to issue such papers directly from the Institution.

Respectfully submitted,
ARIZONA SCHOOL OF MINES,
(Signed) W. P. BLAKE,
Director.

Department of English,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: The following is a report of my work as Professor of English during the year 1901.

During the entire academic year ending with June 6, 1901, I instructed in English the fourth preparatory, the freshman, and the junior classes, the remainder of the instruction in this branch being performed by Miss Eilzabeth M. Plimpton, who had charge of the third preparatory and sophomore classes, and Mrs. Emma M. Guild, who taught the first and second preparatory classes.

The work of the above classes was conducted according to the outline laid down in the ninth annual Register of the University. In the spring of 1901 the English courses were revised when changes were made in the courses of other departments. In the revision the time covered by courses in English in the University was increased from three years to four years and the work was so arranged as to extend over more ground and to offer greater choice in subjects than before. The courses now offered in English are as follows:

English 1-2, Nineteenth Century Prose. This course has been changed by the addition of a rapid sketch of the history of English literature from the earliest time to the present, this part of the course occupying about one-fifth of the time during the year. The historical sketch was considered especially desirable since the students graduating from the University are required to take this year's course in English although they may pursue the subject no farther.

English 3-4, Advanced English Composition. This course has been practically unchanged by the revision.

English 5, 6, 7, 8, 9, 10, 11, 12. These courses need no comment in detail since they are of the same nature, covering the history of English literature from Shakespeare to Tennyson. The literature is taken up by periods through lectures and discussions. The whole body of work of certain selected authors being considered as much at length as possible. No text-book is used, for the library of the University is the place where the student is expected to find his material.

Rhetoricals—Rhetorical exercises required of students have been cut down from three to two each year to correspond with the system of semesters. For the present year it was considered advisable that credit in rhetorical exercises should be granted for work done by students under supervision by the English department for the monthly magazine.

It is to be hoped that in the near future some system of general exercises more attractive to the students and no less valuable to them may be devised to take the place of the present assembly exercises.

In September, 1901, when the above revised courses were put into operation it was found necessary to combine the seniors and juniors in one class and to change the work slightly to meet the needs of these particular students. In the course of another year the classes will adjust themselves to the new requirements. Since the opening of the present academic year I have had personal charge of all the University English classes.

When the University courses were revised last spring changes were made in the requirements in English so that these would conform as nearly as possible to those of the association of New England colleges. Our new requirements will go into effect in 1903 and meanwhile the English work in our own preparatory department has been increased to correspond.

The English classes in the preparatory department for the present academic year have been in charge of Miss Hattie Ferring and the work done has been supplemented by the course in English reading conducted by Miss McGaughey. By means of the English reading classes we are able to cover all the work in the preparatory courses laid down by the New England requirements, though it is not possible to do the work so thoroughly as there contemplated.

All of which is respectfully submitted.

(Signed) HOWARD J. HALL.
Professor of English.

Library University of Arizona, Dec. 31, 1901.

Professor Frank Yale Adams,
Acting President, University of Arizona.

Dear Sir: The following is a report of the condition of the University library on January 1st, 1902, together with such other matter as may be of interest in connection therewith:

Bound volumes catalogued	5,387
Bound volumes not catalogued	879
Total bound volumes	6,266
Pamphlets and unbound reports (est.)	11,000
Bound volumes added since Dec. 1, 1901	879
Outstanding order at date (est. vols.)	300
Total cost of library to the University, including fixtures and card catalogue, but not including gifts ($185)	$10,342.15 *

The work of the library has gone steadily forward since the last annual report and we are especially to be congratulated at the prospect of a new building in the immediate future. Meanwhile the danger from fire has not diminished and the value of the collection is increasing.

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*A. Close approximation: Some bills outstanding.

The floor space of the library has been enlarged 25 per cent during the year, adding much to the comfort of the room and relieving the cramped conditions of a year ago; but we find, of course, that more space is constantly needed to house the books and to provide for their increasing use. In another year the room will be crowded as much as it was a year ago.

As the number of students in the upper classes grows there is greater demand for the use of the library. Recently we have added to the number of open hours so that at present the room is open to students from 8:30 A. M. to 8:30 P. M., with the exception of one hour and forty-five minutes at lunch and dinner, on four days in the week; and on Friday, Saturday and Sunday at hours varying to meet the demand.

During the present year the former policy of the librarian and the heads of departments has been continued in respect to building up a symmetrical collection of books. Among the purchases for this year we have secured a complete set each of the *Transactions of the American Institute of Mining Engineers* and of *Littell's Living Age.*

The work of the librarian for the past twelve months has been the purchasing and cataloguing of new books and the re-classification and arranging of the entire library in harmony with the system almost universally used throughout the United States. This re-classification is a most laborious task which now, since the resignation of the assistant librarian, falls almost wholly upon the librarian. Student labor can only be depended upon for only a part of even the mechanical work necessary, since skill and perfect accuracy are prime requisites. About one-third of this part of the work is now done. It proceeds slowly for the librarian's time is largely taken up with such routine work as correspondence, receiving the mail, and library monitor work.

A new charging system has been devised and is now being installed. This particular system is a combination of several others in actual use, and will exactly meet our particular needs. It will furnish a record of the whereabouts of any book at any time, of the number of times any book has been used, and of the books read by any student during his course.

I will call your attention to the needs of the library in the way of permanent fixtures which could be moved into the expected new building. We especially need binders for newspapers and periodicals, racks for the same, chairs, a book truck and other library furniture. I would also urge the appropriateness of charging a small library fee to each student in order to form a fund for the purchase and repair of furniture, for replacing lost periodicals, for bindings and for general library repairs. At present a considerable share of library expense is caused directly by the use and wear of library material by students, and I know of no reason why they shoud not share the expense of repairs and of wear and tear as they do in other laboratories.

Last summer I was enabled by the kindness of the Board of Regents to visit a few of the leading libraries of the country and to investigate methods of library building, construction and administration. I had expected to incorporate my special report of that investigation with this report, but certain material that I very much need to make the report complete is not yet at hand, and I beg to be allowed a few days in which to collect and arrange it.

Very respectfully submitted,

(Signed) HOWARD J. HALL.

Librarian.

Department of Mathematics and Mechanics,
University of Arizona, Tucson, Ariz., Dec. 12, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to report for the calendar year, 1901, upon the teaching of mathematics in the entire University, and upon such other teaching as was done by myself as follows:

PURE MATHEMATICS.

Arithmetic, First Sub-collegiate class; Textbook, White's New Complete Arithmetic. This course consists of a review of the more important parts of arithmetic with special attention to percentage and its application.

Class of 35 pupils taught five periods per week, January to June, by Mrs. E. M. Guild.

Class of 45 pupils taught five periods per week from September to December by Captain G. W. Cole.

Elementary Algebra. Second and Third Sub-collegiate classes. Textbook, Well's Essentials of Algebra. This course embraces elementary algebra through quadratic equations.

Class of 26 second sub-collegiate pupils taught five periods per week, January to June, by Mrs. E. M. Guild.

Class of 30 third sub-collegiate pupils taught five periods per week, September to December 1st, by Hattie Ferrin and transferred on the latter date to Captain G. W. Cole.

Plane Geometry. Fourth sub-collegiate class. Textbook, Wentworth's Plane Geometry. This course covers the whole of plane geometry with the solution of many originals.

Class of 12 taught five periods per week from January to June by Miss L. H. Foucar.

Class of 34 taught five periods per week from September to December by Prof. Woodward.

Higher Algebra. Freshman class. Textbook, Downey's Higher Algebra. Class of four taught five periods per week, January to June, by Prof. Woodward.

Analytical Geometry, and Differential Calculus. Sophomore class. Textbooks, Nichol's Analytical Geometry, and Hall's Calculus. The last six weeks only of the time is given to beginning calculus.

Class of 6, taught five periods per week, January to June, by Prof. Smith.

Solid Geometry. Freshman Class. Textbook, Wentworth's Solid Geometry. Class of 14 taught five periods per week, September to December, by Prof. Woodward.

Trigonometry. Sophomore Class. Textbook, Well's Trigonometry. Class of 7 taught September to December by Prof. Woodward.

Calculus. Junior Class. Textbook, Hall's Calculus. One student taught five periods per week, January to June, by Prof. Woodward.

Class of 8 students taught five periods per week, September to December, by Prof. Smith.

APPLIED MATHEMATICS AND SCIENCE.

Book-keeping. Sub-collegiate department. This subject is an elective one open to the two higher classes of the sub-collegiate department. It is taught by the Budget system. The work is individual and each student progresses as rapidly as his time and attentiveness enable him to do the work.

A class of 32 taught every day from January to June by Mr. E. J. Hollingshead.

Elementary Science. First Sub-collegiate class. This course included exercises in mensuration, elementary physics and chemistry. Much time and attention was given to English composition in the notes written by the pupils on the experiments. The work was largely such as should be done in the grammar grades before the pupils enter the sub-collegiate department, and such as will be done there when the territorial course of study makes adequate provision for science in the grammar grades.

A class of 31 in two sections each reciting four periods a week, was taught from January to June by Prof. Woodward.

Kinematics and Thermodynamics. Junior and Senior classes. On account of the demands made upon our limited teaching force, this class is taught only every second year, and hence the junior and senior classes are required to take it together.

Under the head of kinematics, the course includes a study of the various methods of transmitting motion in machines such as toothed gearing, friction gearing, and belts, relative velocities, quick return motions, etc.

Under thermodynamics are included: Theory of the steam engine, calculation of heat units used and power and power development, comparison of different types of engines, steam valves and valve diagrams, theory and use of indicator, compound engines, steam valves and valve diagrams; theory and use of indicator, compound engines, types and managements of boilers. A class of five was taught from January to June five periods per week, by Prof. Woodward.

Hydraulics. Textbook, Merriman's Hydraulics. One senior four periods per week, September to December, by Prof. Woodward.

Logic. Textbook, Jevon's Elements of Logic. This course includes an elementary study of both inductive and deductive Logic. On account of the demands on the time of our limited teaching force this course is given only every other year.

Class of five seniors, four periods per week, September to December, by Prof. Woodward.

As a whole the classes enumerated above have made satisfactory progress. We receive many students who are poorly prepared to carry on their class work. Some suffer because they were in early years deprived of a suitable chance to obtain a thorough elementary education, and others because of the length of time that has elapsed since their elementary training. But all are thoroughly animated by the desire to make steady and rapid progress, and this is the most important factor in securing satisfactory results.

In one respect our students are particularly fortunate, namely, in the small size of most of our advanced classes, which enables the students to receive an amount of personal attention from their instructors which would be impossible in a larger institution.

I would call attention to one condition that needs to be remedied. A number of subjects taught by Prof. Smith and myself are taught on alternate years only. This is the only way with the present sized teaching force that we can offer all the subjects that ought to be included in our curriculum. But it is unsatisfactory because it always happens that some students are debarred entirely from a particular subject on account of the inability to arrange their work suitably. Also it often happens that subjects depending upon a definite amount of mathematical preparation must be taken up in a certain order or consecutiveness. Putting students from different classes together in these subjects necessarily interrupts the natural order, entails considerable extra work upon the instructor and embarrasses the students in their efforts. The remedy for this condition is obviously a larger teaching force.

Respectfully submitted,

(Signed) S. M. WOODWARD, A. M.,

Professor of Mathematics and Mechanics.

Department of History, Political Economy and Pedagogy,
University of Arizona, Dec. 30, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit the following report of the work of the Department of History, Political Economy and Pedagogy during the year 1901:

HISTORY.

American History. First Preparatory class. Textbook, Smith's Topical Manual with references. This course is a review of U. S. History with the object of accustoming the pupil to the library method of work in history and also to bring out prominently the relation of events as cause and effect. A class of 30 was taught by Mrs. N. B. Aguirre and Bessie Smith from January to June. A class of 38 was taught by Capt. G. W. Cole from September to December and by myself during December.

General History. Third sub-collegiate class. Textbook, Adams's European History, with assigned reading. This course covered Ancient and Mediaeval History. A class of 32 was taught by me three periods a week from January to June.

A class of 36 was taught by Hattie Ferrin three times a week from September to January.

English History. Freshman class. Textbook, Green's Shorter Course with assigned reading covering in detail the whole period of English History. A class of five was taught by me five times a week from January to June. A class of seven met five times a week from September to January.

American Constitutional History. Junior and Senior classes, lectures and assigned reading. This course covered by means of lectures, the growth and development of our constitutional history to the Civil War.

A class of eight was taught by me five times a week from January to June. This course is given only in alternate years.

ECONOMICS AND POLITICAL SCIENCE.

Civics. Fourth sub-collegiate class. Textbook, Fiske's Civil Government in the United States. This course is made practical by the discussion in connection with the text of practical questions of government. I instructed a class of 15 from January to June twice a week.

Political Economy. Junior and senior classes. Textbook, Walker's Political Economy. The first part of this course is a study of the elementary principles of political economy, which is followed by a course in Sociology, which takes up the discussion of many practical topics with original investigation and a thesis. This course is given only in alternate years. I instructed a class of four five times a week from January to June.

PEDAGOGY.

Psychology. Junior and senior classes. Textbook, James's Psychology. This course, which is given in alternate years, is taught with special reference to its application to teaching. I have instructed a class of six five times a week from September to January. This will be followed by a course in History of Education, School Management and School law.

PARLIAMENTARY LAW AND PRACTICE.

I have also met the third and fourth sub-collegiate classes once a week during the year for work in parliamentary practice and debate. The classes were organized with Constitution and By-Laws and went through the regular routine of an assembly. From January to June I met the two classes separately. From September to January they have been combined in one class organized on the plan of the U. S. Senate.

On the whole the work of the students in my department has been very satisfactory. More work and better work has been done than in any previous year. It is planned to offer two new courses in history for college students next year.

All of which is respectfully submitted.

(Signed) F. YALE ADAMS, A. M.,
Professor of History and Pedagogy.

Department of Chemistry and Mineralogy,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I herewith submit report of work accomplished in the Department of Chemistry and Mineralogy for the year ending December 31, 1901.

CHEMISTRY IN THE PREPARATORY DEPARTMENT.

During this year Chemistry was offered for the first time in the Preparatory Department, one-half year's course being given under the instructorship of Prof. R. H. Forbes. The work offered during the spring of 1901 consisted of lectures and practical work in the laboratory. Eleven students availed themselves of the course.

CHEMISTRY IN THE COLLEGE DEPARTMENT.

Three full years are offered in the Department of Chemistry in the College, consisting of courses in Elementary Chemistry and Qualitative Analysis, Quantitative Analysis and Metallurgical Chemistry. The class in Elementary Chemistry consisted of 17 members, of which 12 remained to the end of the year (June, 1901). The greatest number of those leaving dropped out on account of incompetency, being eager to take up the subject before prepared. This year the class has a total number of 14 registered, of which 9 are still members. The smaller number this year is due to more stringent requirements for entering the class.

Last year the class in Qualitative Analysis consisted of 9 members, all of whom remained to the end of the year. This year 13 have registered and are still members of the class.

The class in Metallurgical Chemistry last year had one member; this year six are taking the course.

Assaying is taught as a part of the course in Metallurgical Chemistry. Counting the special students there were nine taking the subject last year.

SPECIAL CLASSES.

Qualitative Analysis, which is usually taught in the Spring term, has been offered this fall to accommodate several students coming to us from other Colleges. There were seven who registered in this course of whom three have been promoted to higher classes. A special course in Mineralogy is offered in the spring to the special mining students. This course consisted of but two members.

Two students completed last June the special mining course (two years), and there are possibly ten students still following the course, though we hope to persuade some of these to take the full mining course.

All of the above subjects in the College are under the instructorship of one Professor. It is recommended that as soon as possible an instructor be appointed to take the subject of Elementary Chemistry and also to assist in instructing in the Qualitative and Assay laboratory so as to allow the Professor more time to devote to the advanced courses which are being newly introduced, and also to direct some of his attention to investigating various chemical and metallurgical problems of interest in Arizona. As an illustration of this I would say that frequently graduates of our University have written to us for information concerning chemical problems which required investigation which we could not give, having no time at our disposal for investigation.

It is also recommended that more room be supplied to the chemical laboratories. I regret the necessity of making the statement that some of the courses offered this year in the important subjects of Chemistry and Mining are proving but semi-successful owing to the lack of room to carry out the work.

We have excellent apparatus but the students are so crowded in their work that in some cases good results are almost impossible.

I wish to request in closing that in order to meet this want a large room be fitted up in some part of the building for a laboratory, the place now being used as an assembly room being most convenient.

Respectfully,
(Signed) F. N. GUILD, B. S.,
Professor of Mineralogy and Analytical Chemistry.

Department of Manual Training,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit herewith the report of the Manual Training Department for the year ending Dec. 31, 1901:

During the year the following machines and tools have been added to the equipment:

One Prentice Bros. 24-inch Drill.
" Woodward & Powell 24-inch Planer.
" Cincinnati Shaper, 16-inch.
" Pratt & Whitney 14-inch Lathe.
" Browne and Sharpe No. 1 Universal Grinding Machine.
" Diamond Emery Grinder.
" American Machinery Co.'s Band Saw.
Twelve Parker Vises.
Assortment Brown & Sharpe's machinists' tools.
" Starrett's machinists' tools.
" Nicholson files.
" Morse twist drills and reamers.
" Shafting, pulleys and belting.

With the purchase of the above the shop and equipment is complete in all essentials.

With the exception of the band saw all the above named tools were purchased for use in the machine shop.

In February the forge shop was opened to its first class. Instruction in the machine shop began in September. The wood-working shop and draughting room were in use prior to January 1st, 1901.

At present four classes are receiving daily instruction in this department. Data in regard to these is tabulated below.

Subject.	Grade	Hours per day.	No. in Class.
Elementary Construction Properties, Materials Care and use of Hand Tools Elementary Drawing	First Sub-Collegiate	1	28
Carpentry Forging Wood Turning Mechanical Draughting	Sub-Collegiate	1	15
Graphics Descriptive Geometry Architectural Drawing	Freshman	2	7
Machine Shop Practice Use of Machine Tools Technical Draughting	College	2	9

It will be noticed that draughting is taught in each class. This simultaneous instruction in shop-work and draughting has been an important feature of the instruction in this department for a number of years. Draughting is the foundation upon which good constructive work depends. By draughting is implied not only drawing on paper but also the draughting of lines on any material objects—in other words the geometrical blocking out of work. It is not the office of the Manual Training to make tradesmen. It is to develop the mind and make it work logically; and to increase its power, through a knowledge of Nature's laws manifested in the properties of materials, to master Nature. With this end in view the student works in all materials, at all trades, applying continuously his knowledge of Mathematics, Geometry, the Sciences and Arts.

I would suggest that we drop as superfluous special classes in artistic drawing and graphics. These subjects are good, but we have not students for all of them, neither have we the number of instructors necessary for so many lines of work. Much essential matter in these courses is brought out in the regular shop courses which, now that our equipment is complete, should receive our concentrated attention. I have outlined a complete course beginning with the most elementary construction and drawing, leading through pattern making, moulding and forging directly to machine shop practice, technical draughting and machine design.

This complete course would be distributed through the preparatory and college years as best suited to the program. It would require the equivalent of two hours' work per day for three years.

Respectfully submitted.

(Signed) D. H. HOLMES,

Director of Manual Training.

Department of Physics and Engineering,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to report to you upon the work accomplished in the departments of physics and engineering during the year 1901 as follows:

In physics a class of seven 4th preparatory students has been taught five times a week from January to June, and a class of 18 from September to December. The usual course common in High Schools and Academies has been given. On three days of the week the class have worked in the physical laboratory. We have been handicapped this fall by the lack of apparatus for our large class, but the appropriation recently made for the physics department is being used for the equipment of the students' laboratory, and it will soon have ample facilities for a class of twenty students.

Preparations have also been made for a new course in physics for college students. It will commence in February, 1902.

In engineering three courses have been given, and as they are additions to the curriculum, they will be described at some length. They are Surveying, Hydraulics and Mine Engineering.

Surveying was taught to a class of sixteen from January to June. Public land surveys; topographical, railroad and mine surveying, and astronomical observations for azimuth, latitude and longitude were taken in order. Every Saturday forenoon entire was spent in field practice. Each student completed a topographic map of the University Campus, and preliminary and location surveys of a line of railway one and one-half miles long were made. The University's equipment of surveying instruments is excellent.

The course in Hydraulics was taught from January to June to the seniors. This course is intended to prepare young men for the designing of canal systems and water supplies for the cities and mines, and the solution of problems incident to pumping and the development of power with turbines and Pelton wheels. The discharge through orifices, weirs, tubes and pipes; flow and sewers, ditches and rivers; measurement of water power; and the various types of water wheels were studied. The greatest need of the engineering department is an hydraulic laboratory.

The course in Mining Engineering has been taught to a class of nine seniors and juniors from September to December. The subjects considered have been, exploratory workings and bearings, rock drills and air compressions, blasting, opening-up workings, timbering, methods of attacking and winning the deposits, hauling and hoisting. Drawings of mining machinery and models of mine timbering have been made, and drills and air compressors have been studied in operation. Plans are already made for taking this class a month hence to one of the best mining districts of Arizona for practical study.

Very respectfully,
(Signed) GEO. E. P. SMITH,
Professor of Physics and Engineering.

Department of Biology.

University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit the following as the Annual Report of the Department of Biology:

Scientific work for its value to science should receive more encouragement in the University than it has up to this time. Especially should this be true in a new and undeveloped country like our own. Little is known concerning the number and distribution of our flora and fauna and practically nothing with reference to their ecological and biological relations. Up to this time no systematic study of the plants or animals has been attempted, and though many scientists, some of note, have made extensive collections from time to time during the past forty or fifty years within the present territorial limits, the work has always, of necessity, been of a fragmentary nature. Indeed, up to this time no list of species, published or otherwise, has been attempted, although such a list is of prime importance to the economic as well as the scientific interests of the state. There are many reasons why the above should be the case: the country is sparsely settled, railroad communications as well as other means of travel are meager and the work of the botanist, from the nature of the case, is of an intensely economic turn.

Considering the above and also the fact that no advanced scientific progress can be made until something proximate is known as to the number, character and distribution of species within our borders, and more than that, the explanation of such distribution which is of practical as well as scientific importance, I have felt justified in beginning the Botanical Survey of Arizona. Along with the survey work the species can also be studied with reference to their ecologic and biologic significance. Data concerning time of blossoming, seed dissemination and seed protection, principles of regional limitation, frequence and abundance, propagation and reproduction, rotation and alteration of species, protection of the plant body, relation between root and stem, growth and other phenomena, will be collected as rapidly as possible and in due time interpreted biologically. It goes without saying that these purely scientific truths will be found to have an economic bearing as they come to be better understood. Many weeds and fungi could be easily controlled if we knew more of their ecology and biology.

The Griffiths' collection of grasses, in all about 200 specimens, has been mounted and placed in the herbarium, thus greatly augmenting this part of the collection. Specimens of the native flora are being collected from various parts of the state as opportunity permits and deposited in the herbarium at the rate of one hundred a month. If this work can be continued it is to be hoped that in the course of two or three years we shall have a collection fairly representative of the native species of the state. Exchange of specimens is also taking place between this University and the University of California.

In addition to this work the fungi of the state. parasitic and otherwise, should receive their proper and merited attention. Dr. Griffiths of the Department of Agriculture has kindly offered to assist in working up the fungi provided that material can be collected in sufficient quantity and forwarded to him. This offer has been taken advantage of and we shall hope in the near future to have this work well begun. Three hundred species of West American Fungi collected and distributed by Dr. Griffiths have been purchased recently by the University of Arizona, and these, with four hundred species of Dakota and Nebraska fungi contributed by the writer will form the nucleus of a fungi herbarium. Altogether, during the course of the year between 1200 and 1500 sheets will be added to the working capacity of the University herbarium. It should also be added here that the writer's collection of 3000 mounted plants is available to the biological department for reference.

I regret very much to say that on the 17th of December the new Leitz microscope and complete equipment was stolen from the botanical laboratory. Various theories are at hand concerning the mysterious disappearance, but none tend to throw any light in the unfortunate affair. The University was justly proud of this high grade instrument since for bacteriological work it is indispensable. In case the return of this microscope is not accomplished, it is to be hoped that one of equal grade will be secured to fill the place.*

*This instrument has since been recovered.

Respectfully submitted,
(Signed) J. J. THORNBER,
Professor of Biology.

Department of Languages,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit the following report of the Department of Ancient and Modern Languages for the year 1901:

FIRST YEAR SPANISH.

January to June, 1901, Mrs. Aguirre; No. of pupils, 48; Textbook, DeTorno's Combined Method. September to January, 1902, L. H. Foucar; No. of pupils, 50; Textbook, DeTorno's Combined Method.

SECOND YEAR SPANISH.

January to June, 1901, Mrs. Aguirre, 11 pupils; Textbook, Historia de Roma. September to January, 1902, L. H. Foucar, 17 pupils; Text, DeTorno's Combined Method, Martin's El Si de las Ninas.

FIRST YEAR LATIN.

January to June, 1901, L. H. Foucar, 16 pupils; Text, Collar and Daniell's First Latin Book and Viri Romae. Sept. to Jan., 1902, L. H. Foucar and H. Ferrin, 20 pupils, same text book.

SECOND YEAR LATIN.

January to June, 1901, L. H. Foucar, 5 pupils; Texts, Viri Romae and Caesar. Sept. to Jan., 1902, H. Ferrin, 6 pupils; Texts, Viri Romae and Second Year Latin Book.

THIRD YEAR LATIN.

January to June, 1901, L. H. Foucar, 4 pupils; Texts, Cicero, Catalinian orations, three books of Virgil.

FIRST YEAR FRENCH.

January to June, 1901, M. E. Plimpton, 6 pupils. Whitney's French Grammar and L'Abbe Constantin. Sept. to Jan., 1902, L. H. Foucar, 14 pupils. Whitney's French Grammar.

SECOND YEAR FRENCH.

January to June, 1901, M. E. Plimpton, 4 pupils; Le Cid and Les Miserables. Sept. to Jan., 1902, L. H. Foucar, 4 pupils, L'Avarre, Athalie and Grammar.

All of which is respectfully submitted.

(Signed) LOUISE H. FOUCAR,
Professor of Ancient and Modern Languages.

Department of Domestic Science,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit the following report of the Domestic Science Department for the year ending Dec. 31, 1901:

From January to June a class of 26 were taught eight hours per week, five hours of which were devoted to Cooking and three to Sewing.

From September to December, sixteen in class taught eight hours per week, six of which were devoted to Cookery and two to Sewing.

The department is fairly well equipped, but the following could be used to advantage: Charts, etc., for studying compositions of Foods, Charts for the sewing department. Reagents for use in the analysis of foods. All above classes in Sub-Collegiate Department.

Respectfully submitted,
(Signed) MABEL GREY HOOVER, .
Instructor in Domestic Science.

Military Department,
University of Arizona, Dec. 31, 1901.

F. Yale Adams, A. M.,
Acting President, University of Arizona.

Sir: I have the honor to submit the following report of the Military Department of the University of Arizona, for the year 1901:

From January to June the Military Department was in charge of Lt. Col. F. Yale Adams. The Cadets were formed into a battalion of two companies, one under command of Captain Rudolph Castaneda, consisting of twelve officers and 35 men: the other under command of Captain George M. Parker, consisting of 12 officers and 34 men. There were also four staff officers.

A signal corps was organized and instructed from January to June by Captain E. H. Andrews.

I took charge of the Military Department September 25th, 1901. I organized the Cadets into a battalion consisting of two companies of three officers, eight non-commissioned officers and thirty-two privates, each. There was also a battalion staff and non-commissioned staff consisting of an adjutant and a sergeant major.

The instruction covered the school of the soldier and the company. The companies have made good progress, due to the efficient services of the officers and non-commissioned officers, who deserve great praise for their hard work.

The discipline is good but can be better.

Being in charge of the men's dormitory, I would respectfully call attention to the need of some means of heating water for bathing purposes during the winter months.

The present method of lighting the building by means of coal oil is also very unsatisfactory.

Very respectfully,
(Signed) GEO. W. COLE,
Captain U. S. Army, Commandant.

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